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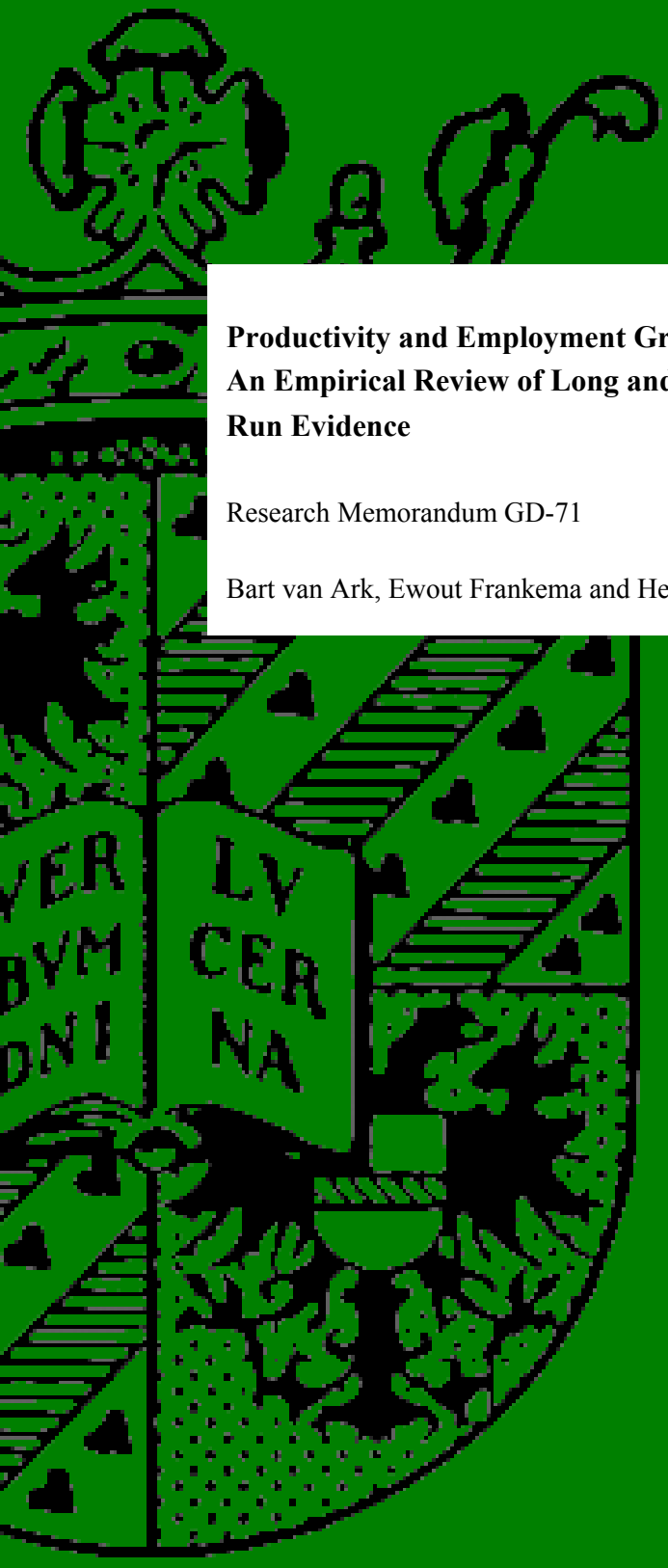

Productivity and Employment Growth: An Empirical Review of Long and Medium Run Evidence

Research Memorandum GD-71

Bart van Ark, Ewout Frankema and Hedwig Duteweerd

RESEARCH MEMORANDUM

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Background Working Paper for the World Employment Report 2004
International Labour Office, Geneva

by
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Groningen Growth and Development Centre
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Abstract:
This study argues that the creation of productive jobs is the key to economic growth, social development and improvements in living standards. The study provides extensive empirical evidence showing that the long run trend has been towards simultaneous growth in per capita income, productivity and employment growth. However, depending on the type of indicator and the time frame adopted, there are legitimate concerns about the distribution of the productivity and welfare gains from growth both within as well as between countries. Following the analysis of the long term growth pattern (Chapter 2), the study investigates under which conditions, in which regions and which industries a trade-off occurs between productivity and employment growth. In Chapter 3 patterns of employment-productivity trade-offs are established across regions and time periods at the macro level. Chapter 4 focuses on sectors of the economy. In Chapter 5 the study discusses the policy areas that will be most conducive to breaking or reducing the trade-off between productivity growth and employment in order to exploit the long run growth potential. We argue that, in addition to sound macroeconomic policies, a sensible role for market forces in allocating resources to their most productive uses is important. However, the key challenge is to create an institutional environment that can alleviate some of the negative effects in the short and medium run while not hampering the realisation of the long run growth potential. Support to the creation of social capabilities and national innovation systems are important policy areas to achieve this goal. While strengthening an economy's fundamentals in the short and medium run, these also contribute to the virtuous circle of productivity growth, employment creation and poverty alleviation, which is the main theme of the *ILO World Employment Report 2004*.

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1. Introduction

1.1 Introduction

The creation of productive jobs is the key to economic growth, social development and improvements in living standards. Those economies that today are characterised by the highest incomes per capita in the world economy, are also those which have shown the most impressive increase in labour productivity growth over the past two centuries. For example, between 1870 and 1998 the twelve core countries of Western Europe increased per capita income and labour productivity about nine-fold. In the United States, which became the world's productivity leader by the end of the 19th century, per capita income increased more than eleven times and labour productivity increased eight times.[1] The driving factor behind the rapid growth in productivity in the Western world has been the symbiotic combination of investment in human and physical capital and technological progress, which has pushed per capita income for the large majority of the populations in these economies far beyond subsistence levels.

Despite these undisputed achievements in world economic growth, there have been continuous concerns about the distribution of the productivity and welfare gains from growth both within as well as between countries. In the past four decades, there has been a widening divergence in productivity and per capita income performance between countries. For example, in East and South East Asia labour productivity increased 4 times between 1960 and 2001, whereas it increased only 1.6 times in Latin America and 1.5 times in Sub-Saharan Africa. Personal income inequality within countries has also increased during particular episodes of development, but the general picture points towards a much greater diversity in the world income distribution due to between-country inequality than within-country inequality.

Hence although there is little doubt that economic and social progress has brought increased welfare to the average population in countries that have undergone these transformations, there are winners and losers in the process. The interesting question, that has been the theme of the work of many scholars, is whether any systematic pattern can be found in terms of groups that benefit or suffer under economic growth. This question is not at all new, and can be traced back to the works of 18th and 19th century classical economists, including Malthus, Ricardo and Marx, and classical sociologists, such as Tönnies and Durkheim. Many of the concerns were fed by the possible negative impact of structural changes in the economy and society on the standard of living. For example, the greater role of capital in the economy and the rise of the scale and scope of economic activity have often been seen as major threats to the effective use and appropriate rewarding of human effort in the production of goods and services. However, there have also been many scholars – in particular during the late 19th and 20th centuries – who have argued that technological change and increases in education are important keys to the creation of better jobs, i.e. jobs that are more productive, better paid and that provide security to people to provide themselves with an adequate income. In the terminology of the ILO this may be referred to as the creation of "decent" jobs.

[1] See Maddison (2001).

Our concern in this study is threefold:

- Firstly, we aim to uncover whether and how economic growth and the rise in productivity has led to the creation of better jobs. We provide extensive empirical evidence which suggests that the long run pattern clearly exhibits a trend of simultaneous per capita income, productivity and employment growth, although there are differences over time and between regions (Chapter 2).
- Secondly, we investigate under which conditions, in which regions and which industries a trade-off occurs between productivity and employment growth. In the medium run, trade-offs between productivity and employment growth frequently occur, and certain patterns can be established across regions and time periods (Chapter 3) and between sectors of the economy (Chapter 4).
- Thirdly, we identify the policy areas that will be most conducive to breaking or reducing the trade-off between productivity growth and employment in order to exploit the long run growth potential (Chapter 5). We argue that, in addition to sound macroeconomic policies, a sensible role for market forces in allocating resources to their most productive uses is important. However, the key challenge is to create an institutional environment that can alleviate some of the negative effects in the short and medium run while not hampering the realisation of the long run growth potential. Support to the creation of social capabilities and a national innovation system are important policy areas to achieve this goal. While strengthening an economy's fundamentals in the short and medium run, these also contribute to the virtuous circle of productivity growth, employment creation and poverty alleviation, which is the main theme of the *ILO World Employment Report 2004*.

1.2 Further Development of the Main Questions

The main questions posed above lead to a range of related questions, which we will address in detail in this report. These related questions include:

- Which conceptual framework do we need to apply to better understand the relationship between productivity and employment growth? In Section 1.3 we introduce a comprehensive overview of factors contributing to GDP per capita growth that can be decomposed into labour productivity growth and increased labour force participation. Underlying the growth of labour productivity is the increase in inputs of factor resources. These include the production factors, such as labour, land, and capital, mostly covered in traditional production functions. But it should also cover the changes in the quality of these inputs (human capital creation, new vintages of capital, etc). And it should include resources that are often missing in a straightforward production function framework, such as human capital, knowledge capital, organisational capital and social capital. Underlying the input of resources there are a range of factors related to the global and local institutional framework (in particular markets, the innovation system and legal arrangements) which determine the allocation of these resources. The latter are of crucial importance in generating productivity and job growth.
- Given the limitations in quantifying many of these variables, on which indicators should our study be focused in the light of the broader conceptual framework outlined above? Despite the broad comparative and empirical framework adopted in this study, our primary focus is on measures of

labour productivity and labour input, as well as on the underlying determinants of labour input, such as hours, participation rates, demographic developments, and changes in skill structure, etc..[2]

- How does a sectoral or industry perspective contribute to our understanding of the trade-off between productivity and employment growth? In Chapter 4 we adopt a sectoral perspective, in order to establish the impact of structural change. Shifts of productivity resources from low to high productivity industries (for example, from agriculture to industry) have strongly featured in the development economics literature. More recently the interest has also been in shifts within manufacturing (stages of comparative advantage), from manufacturing to services, and (related to the latter) shifts of labour towards the informal economy.
- How should the institutional factors that are crucial in this process be made operational? In Chapter 2 we focus on one important determinant that contributes to the realisation of the potential for productivity growth, namely the social capabilities for growth (Abramovitz 1986). Social capabilities include the capacities of individual human beings (human capital) and the political, commercial, industrial and financial institutions. Although the strengthening of social capabilities should not be seen as the panacea for the virtuous circle of growth, job creation and poverty alleviation described above, it provides important insights into the nature of policies and institutional design that matter. In Chapter 5, we also pay attention to the concept of national innovation systems, as an approach to support policy focus on innovation, productivity and employment creation.
- How does the time frame we adopt interact with the relationship between employment and productivity growth? A short-run approach typically focuses on business cycle aspects with the trade-off being absent due to the pro-cyclical nature of productivity and employment growth. The short-run perspective will be left out of consideration in this study. In the long run the relation between productivity and employment depends on the conditions under which technological change and innovation emerge (see Chapter 2). In the medium run, the possibility for a trade-off between employment and productivity growth to occur is biggest. The nature of the trade-off depends on the elasticities of demand and supply of labour, which in turn depend on institutions governing the wage bargaining process, flexibility of labour markets, the incidence of part-time and temporary labour, and the nature of technological change (Chapter 3). An issue of fundamental importance therefore is that policies and the institutional design need to be focused on finding a balance between reducing the social implications of medium-run trade-off, without destroying the opportunities for fuelling the virtuous circle of productivity growth, job creation and poverty reduction in the long run (Chapter 5).

In addition to these questions, there will be a range of related issues that will be touched upon in this report. For example:

- Does the relationship between employment and productivity fundamentally differ between low income countries ("followers") and advanced economies ('productivity leaders')?
- Can the historical perspective of structural change, and its impact on employment be applied to present-day developing economies?

[2] In Appendix I we briefly introduce these measures and discuss data quality issues in a comparative framework. See also ILO (2003), Chapter 18.

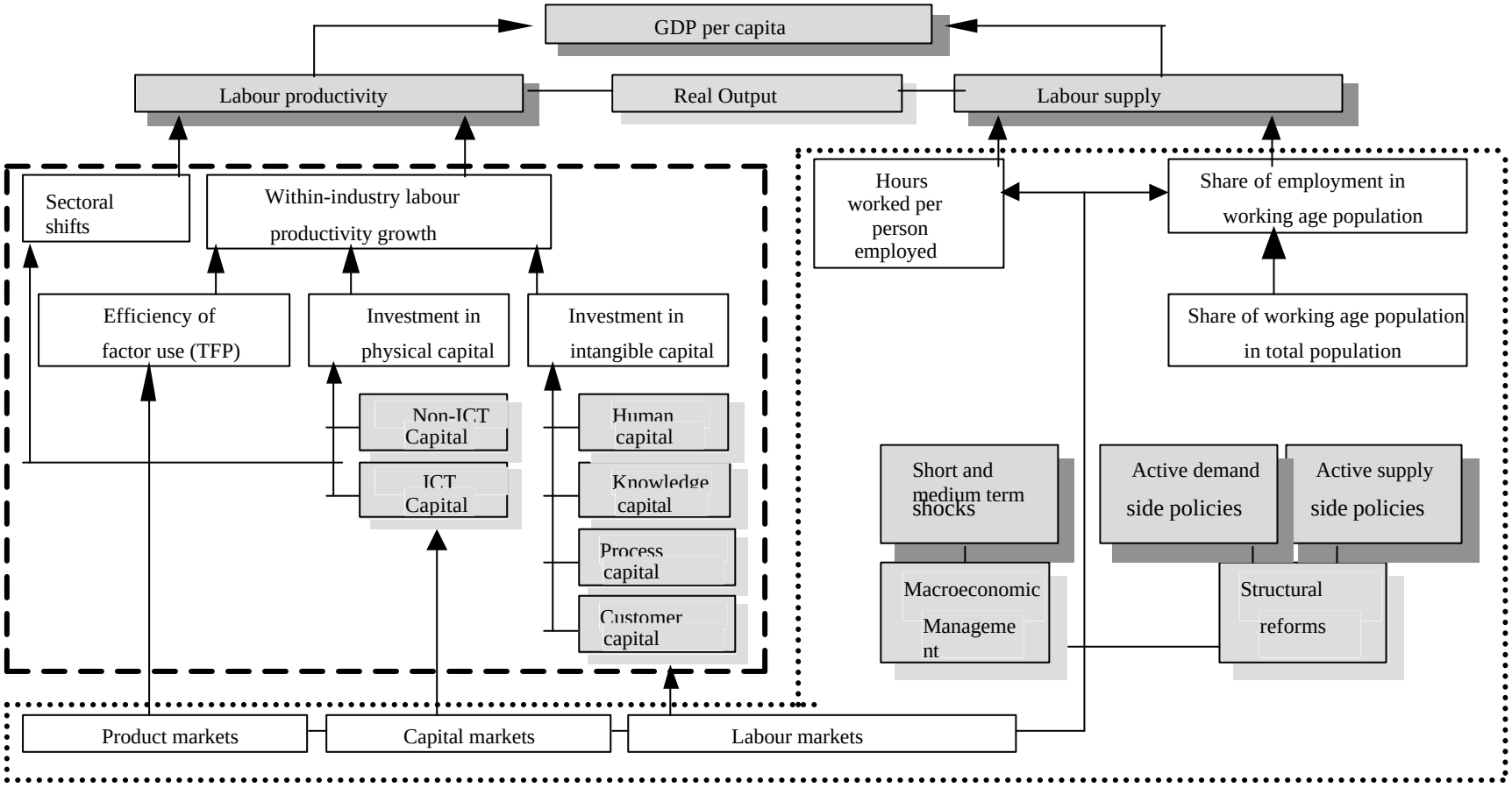
- If not, what are the main differences (type of technology used, international dependencies due to trade, FDI, etc., divergence between modern and traditional sectors of the economy, etc.)?
- How does innovation in a broad sense (technological but also organisational innovation) contribute to tackling the trade-off between productivity and employment?
- How does organisational and social capital translate into institutions that drive the economy from medium run trade-offs to long run positive influences?
- Are innovation systems as known for advanced countries applicable to low-income economies?
- How do these systems cope with the dichotomies between a large reserve of low-productivity labour (in agriculture and the informal economy) and small but dynamic group of high-productive workers in manufacturing and modern service industries?

1.3 Income, Productivity and Employment: A Conceptual Framework

Figure 1.1 presents the conceptual framework to study the sources of income growth. This framework is rooted in a traditional growth accounting framework, highlighting the role of labour input, physical capital input and total factor productivity, but with several crucial extensions. Figure 1.1 starts from taking GDP per capita as the ultimate measure of economic performance as it is a fairly comprehensive – albeit imperfect – measure of living standards. GDP per capita growth is driven by an increased input of labour and/or labour productivity growth. Indeed one can simply show that the difference in the growth of average per capita income and labour productivity can be accounted for by changes in a range of labour market and population indicators (see Chapter 3, Section 3.2).

At the aggregate level labour productivity growth is essentially driven by two mechanisms. The first involves shifts of resources from sectors with either low productivity levels and/or low productivity growth rates to sectors with high productivity levels and/or high productivity growth rates. This process will be referred to as structural change. There is strong evidence that the shift of labour from agriculture to industry has been an important source of productivity growth during the early phases of structural change. The relationship has not been the same everywhere, however, and depends on factors such as the size of the country (and the related openness of the economy) and the relative factor endowments (land, labour and capital). It has also changed over time, depending on such factors as the nature of technological change and the globalization of the world economy (in particular in terms of increased capital flows).

Figure 1.1: Analytical Scheme on Per Capita Income, Productivity and Employment Creation



In the more advanced countries, there have also been signs of a negative effect of structural change on productivity growth, because of the larger role of services in the economy. Also physical capital has changed in composition, with a greater share of computer-controlled machinery and ICT equipment. With the rise of information and communication technology (ICT), new opportunities for accelerated productivity growth in combination with job creation have arisen. These issues will be extensively discussed in Chapter 4.

The second source of productivity growth, which tends to be more predominant in the long run, concerns productivity growth within individual industries (i.e., manufacturing industries or service industries). There are essentially three sources which drive "within industry" productivity growth:

1) The first and most obvious source is investment in physical capital goods (or tangible capital), including machinery and equipment and structures. In particular the distinction between capital goods that embody information and communication technology (ICT) versus non-ICT capital has become more important during the past two decades (see ILO, 2001). Although the contribution of capital to productivity growth will not be explicitly addressed in this study, we will look in some detail at the role of ICT and skill-biased technological change in relation to the productivity-employment trade-off (see sections 3.3 and 4.3 below).
2) A second source of industry productivity growth is investments in intangible capital. For example, the composition of human capital has significantly changed towards a greater share of intermediate and high skills away from a predominant share of low skills. Other types of intangible capital, which includes resources that embody knowledge, organisational changes and relationships with customers, are also an important source of wealth creation. In traditional macroeconomic productivity studies, there is only limited attention for intangible capital. It is mostly restricted to the role of human capital, which is measured as skills of the labour force, and to knowledge capital, which is measured as the stock of R&D. In this study the role of intangible capital is primarily addressed by developing the concept of social capability (Chapter 2).[3]
3) Labour productivity growth is not only the result of a rise in the amount of tangible and intangible inputs per working hour, but also of the efficiency with which these resources are transformed into output, which may be defined as total factor productivity (TFP) growth. From a macroeconomic viewpoint, TFP growth refers to the increase in output relative to the rise in the combination of joint inputs. In more practical terms one may also interpret TFP growth as "real cost reductions" of the inputs, where "real" refers to the fact that the quality of the inputs is assumed to remain constant (Harberger 1998). The latter source of growth, which is the only sustainable source of productivity growth in the long run, is not explicitly addressed in this study. But clearly TFP growth is strongly determined by technological developments, innovation and institutional factors such as the functioning of markets. These issues will come back at various places in the subsequent discussion, in particular in Chapter 5.

The investment decisions concerning tangible and intangible capital, and the (re)allocations of these inputs between industries and firms, are taken in an environment, which is governed by markets in which supply and demand for factor inputs (labour and capital markets) and product and services (product markets) are matched. The environment is partly governed by local or national factors, but is

[3] See, for example, van Ark (2002; 2004) for a more explicit treatment of intangible capital.

partly also under the influence of global developments which are often beyond the control of individual governments ("shocks"). Nevertheless, governments play an important role in setting the "rules of the game" (or institutions) of these markets. Firstly, macroeconomic policies influence the relative prices of capital and labour inputs, which determine the choice of technology. Secondly, the intensity of competition at those markets determines the threat of potential entries and is therefore an important source of the drive for both incumbents and newcomers to innovate. Thirdly, governments also need to create the rules of the game concerning technology creation and diffusion, including an effective patenting and licensing system that meets the demands of a world in which innovation spreads at an increasing pace. Finally, governments are key to developing appropriate supply side policies in the areas of education, research and physical infrastructure to provide a breeding ground for business to generate investment and productive use of resources. The role of the policy environment in relation to productivity growth and employment is discussed in more detail in Chapter 5 of the study.

2. A Long Run Perspective on Employment, Income and Productivity

2.1 Introduction

The remarkable increase in world living standards over the past two centuries is directly related to the creation of more productive and more decent jobs. Although not everybody has become equally better off, the extent and broadness of this improvement is unprecedented compared to earlier times (Table 2.1). For example, between 1500 and 1820 per capita income in the world increased at a meagre 0.05% a year on average.[4] During the first one hundred years following the first Industrial Revolution, per capita income growth in the world economy grew at 0.9 per cent per year on average, which was almost an 18-fold increase compared to the growth rate between 1500 and 1820. Following a dip during the inter-war years, world per capita sharply accelerated to 2.9 per cent between 1950 and 1973. Despite a significant slowdown and a rise in world income inequality since 1973, world income levels still grew substantially faster during the last quarter of the 20th century than during the 19th century.

The remarkable concurrent fact to be noted in Table 2.1, is that the improvement in living standards was achieved while the world population also increased most rapidly. While population growth was less than 0.3 per cent per year between 1500 and 1820, it continuously accelerated since then to over 1.8 per cent per year on average since World War II. This suggests that whereas growth up to 1800 was largely of an *extensive* nature with population and output growth holding each other largely in balance. During the past two centuries growth has become *intensive* as output growth exceeded population growth and per capita income levels increased. Technological change, investment in physical and human capital, increased mobility of goods, capital and labour, and institutional innovations have been the main keys to this process.

An implication of the intensive growth model is that the rise in per capita income has been largely driven by labour productivity growth, which is defined as the rise in output per unit of labour input. In turn the more productive jobs have led to higher wage levels, higher consumption of material goods and services, greater investments by individuals and government in education, training and health. As a result the nature of the jobs themselves changed towards a larger share of high quality (decent) jobs. However, although the evidence generally points in the direction of the creation of more productive and high quality jobs in the world economy, there are large and increasing differences in growth performance across countries.

[4] These estimates and others reported in this section are obtained from Maddison (1982, 1995, 2001). Clearly per capita income is not a perfect measure of living standards, but this relationship is strongly positive at large (see, e.g., the U.N. *Human Development Report*)

Table 2.1: Per Capita Income and Population Growth Rates, 1500-1998

	1500-1820	1820-1913	1913-1950	1950-1973	1973-1998
	Per capita income growth				
Western Europe	0.15	1.11	0.76	4.08	1.78
Western Offshoots	0.34	1.59	1.55	2.44	1.94
Japan	0.09	0.78	0.89	8.05	2.34
Asia (excluding Japan)	0.00	0.12	-0.02	2.92	3.54
Latin America	0.15	0.88	1.42	2.52	0.99
Eastern Europe & former USSR	0.10	0.87	1.50	3.49	-1.10
Africa	0.01	0.36	1.02	2.07	0.01
World	0.05	0.88	0.91	2.93	1.33
	Population growth				
Western Europe	0.26	0.72	0.42	0.70	0.32
Western Offshoots	0.43	2.47	1.25	1.55	1.02
Japan	0.22	0.55	1.31	1.15	0.61
Asia (excluding Japan)	0.29	0.33	0.92	2.19	1.86
Latin America	0.06	1.43	1.97	2.73	2.01
Eastern Europe & former USSR	0.34	1.02	0.34	1.31	0.54
Africa	0.15	0.56	1.65	2.33	2.73
World	0.27	0.58	0.93	1.92	1.66

Note: "Western Offshoots" include Canada, Australia, New Zealand and United States.
Source: Maddison (2001), Table 3-1a

The main purpose of this chapter is to show that process of intensive growth over the past two centuries, which implies that productivity and population growth have moved in tandem, can be associated with a huge transformation of the population and labour force in terms of its composition and quality. This transformation has been enabled by an improvement in social capabilities to exploit the growth potential, and the creation of an effective institutional framework to realise the potential. Cross-country and cross-regional differences in the success of building these social capabilities have been an important source of the inequalities in income and productivity and the creation of employment opportunities.

Below we first introduce a conceptual framework that distinguishes between the potential for growth and the realisation of that potential (Section 2.2). It will specifically address the characteristics of countries which are behind the productivity leader in the world economy, and review the factors that have been identified as key to embarking on a catch-up process. In particular we will emphasise the importance of the social capabilities In Section 2.3 we focus in more detail on the major trends in population and employment indicators and the changes in composition of these indicators. We look at how demographic transition has changed the age structure and composition of the labour force, including an increased participation of women in the labour force in many parts of the world. We also show how - on the whole - labour intensity, which we define as actual total working hours relative to a hypothetical maximum number of working hours, has increased over time although there is substantial variation across regions. Finally in Section 2.4 we show how the quality of jobs has

drastically changed in particular because of strong increase in health and education, and discuss why the impact – although positive – of a greater stock of human capital on productivity does not appear as high as might have been thought.

2.2 Growth Potential and Realisation

Long term developments and outlook

The rapid acceleration of per capita income growth since the early 19th century can not only been seen from the growth rates presented above but also from the changes in average US dollar-converted income for each country. The estimates in Figure 2.1 are converted at purchasing power parities of 1990, so that differences in relative price levels across countries are taken into account.[5] Although the staggering increase in average income in particular since 1950 hits the eye, it is also clear that the cross-country inequality in income has increased.

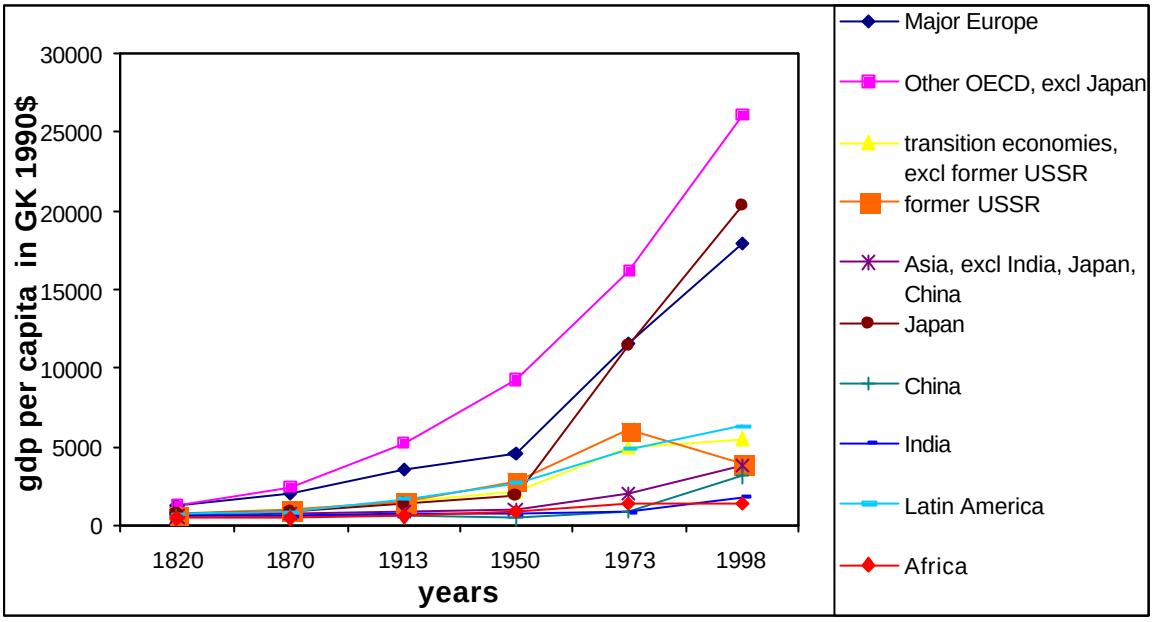
Since 1950, rapid diffusion of technology and adaptation to implement those technologies in the economies have contributed to the strong acceleration in per capita income and productivity growth in Western Europe and Japan. Under the influence of decolonization and the integration in a global economic and financial environment, many low income countries also enjoyed an improvement in growth although mostly at a lower rate than in Western Europe and Japan. Since 1973 the diversity in performance has further increased. The collapse of the international economic arrangements of Bretton Woods and the oil crises of the 1970s have left the international economic environment much more vulnerable. In fact only East Asia improved its performance very considerably, while growth in the western world slowed down and in Latin America and Africa even declined. The Asian financial crisis and its aftermath, the increased threats to global security, and the worldwide slowdown since 2000 have dampened the immediate prospects for further gains even more.

Despite these sources of inequality, it should be stressed that overall world income per capita since 1973 has increased at a rate higher than any of the earlier periods, except for the exceptional period from 1950 to 1973 described above. There are at least two reasons why it is reasonable to expect that this positive aggregate trend may continue. Firstly, as will be discussed below, the potential for growth partly depends on the technological opportunities before us. Over the past two decades the rise in Information and Communication Technology (ICT) has rapidly found its way around the world, and it is an important source underlying the process of structural change in the economy (Chapter 4). Although the productivity effects from ICT production have so far been mainly occurred in the U.S. and a limited number of other countries (including Finland, Ireland, Korea, Taiwan), the diffusion of ICT is taking place everywhere. This provides a great potential for productivity growth through new products (and services) and improved production processes (ILO 2001). Secondly, the literature on the economic effects of globalization generally shows that, on balance, the integration of economies in world trade, the rise of global capital markets and increased human mobility is doing more good than bad to a country's growth potential. It has helped to allocate resources to their most productive uses, which on balance will make most people better off. Due to these forces, most of per capita

[5] Hence one US dollar of income can buy an identical basket of goods and services in each country.

income growth for the world economy was driven by productivity growth, which has improved to 1.9 per cent during the 1990s, up from 1.2 per cent for the period 1973-1990.

Figure 2.1: Long Term Development of GDP per Capita



Note: GDP per capita is converted to U.S. dollars with purchasing power parities based on the Geary-Khamis index method.
Source: Maddison (2001).

Table 2.2: Growth Rates of GDP, Total Labour Input and Labour Productivity, 1960-2000

	Real GDP			Total hours worked			GDP per hour worked		
	1960-1973	1973-1990	1990-2000	1960-1973	1973-1990	1990-2000	1960-1973	1973-1990	1990-2000
Major Europe (a)	4.7	2.4	2.2	-0.3	-0.1	0.2	5.0	2.5	2.0
Major non-Europe, of which (b)	5.2	3.1	2.7	1.5	1.4	0.9	3.7	1.7	1.8
Japan	9.2	3.7	1.4	1.2	0.8	-0.6	8.0	2.8	2.0
United States	4.2	2.9	3.2	1.6	1.6	1.6	2.6	1.3	1.5
Transition Economies	4.4	1.5	-1.9	1.8	-0.1	-1.6	2.6	1.5	-0.3
CEE countries (c)	4.2	1.0	1.3	0.6	0.0	-1.7	3.6	1.0	3.1
former USSR	4.5	1.6	-4.7	2.5	-0.1	-0.4	2.0	1.7	-4.3
Asia (d)	4.4	5.7	6.1	2.2	2.7	1.7	2.2	3.1	4.5
East Asia	9.7	7.4	5.9	4.2	2.7	1.4	5.5	4.7	4.5
South East Asia	5.6	5.4	4.3	2.4	3.2	1.7	3.2	2.2	2.6
China	3.8	6.2	7.5	2.5	2.5	1.6	1.3	3.6	5.9
South Asia	3.3	4.7	5.1	1.5	2.7	1.8	1.8	2.0	3.3
Latin America	5.6	2.9	3.1	2.3	2.4	1.9	3.3	0.4	1.1
Africa	5.0	3.1	2.5	2.4	2.7	2.6	2.6	0.3	-0.1
Middle East	8.9	2.7	3.8	2.5	3.4	3.1	6.4	-0.7	0.7
World	8.9	2.7	3.8	1.9	2.2	1.5	3.2	1.2	1.9

(a) excluding transition economies, including Turkey; (b) Australia, Canada, New Zealand, Japan and United States; (c) Central and Eastern European countries, excluding former USSR; (d) excluding Japan

Source: Groningen Growth and Development Centre (http://www.ggdc.net/dseries/totecon.shtml) and ILO (2003), KILM 18.

An analytical framework of potential and realisation

Although the potential for growth may be good and may even have strengthened over the past decades, it is of course the realisation of that potential and its distribution which matter most. Productivity growth is by no means automatic, even not when the opportunities for growth exist. Exploiting the opportunities requires that countries have sufficient *potential* to advance and fulfill the conditions to *realise* this potential (Abramovitz 1986).

For the most advanced countries the potential to grow is largely governed by the pace at which the frontiers of knowledge can be extended. This pace is governed by the scientific, engineering and administrative possibilities to transfer latent knowledge into useful knowledge.[6] Apart from the *technological capabilities* to adopt and adapt to new technologies, the importance of *social capabilities* is stressed as an important restrictive factor in determining the potential. In short, social capabilities consist of two main traits: 1) the capacities of individual human beings, i.e. human capital, and 2) the political, commercial, industrial and financial organisations and institutions. More specifically, the former includes the levels of general and technical education, and the experience of entrepreneurs and managers with large-scale organisations and practices (Abramovitz 1991, p. 20). This definition assigns an important role to both workers and entrepreneurs in generating the social capability to exploit technological opportunities. As we will argue throughout this report, social capability is also the key to avoid a trade-off between productivity and employment growth in some major sectors of the economy. Indeed sector-specific capabilities determine the innovative standard and growth performance of such different activities as livestock production or electronic goods manufacturing.

Despite the importance of technological and social capabilities to generate the potential for growth, it is also important to establish the appropriate conditions to realise the potential. For this, countries need to *invest in physical and human capital*, support *structural change* and develop *favourable macroeconomic conditions for growth* (see also Figure 1.1 in Chapter 1). Lead times on obtaining results from investment in human capital through primary and secondary schooling, university research and – more in general – establishing an effective national innovation system are often quite long, and countries therefore require a coherent and stable set of institutions that support capital formation. Structural change requires instruments that support the mobility of labour and capital between low and high-productivity sectors of the economy. As change does not always benefit everybody in the short run, one is also in need of a policy framework that creates a balance between compensating the losers and rewarding the winners in such a way that one does not back out of needed reforms through rent-seeking behaviour. Finally, the macroeconomic policy framework can be more or less conducive to investment and growth through its fiscal and monetary institutions, structural policies of national government (e.g. through creating infrastructures on transport, communication and research) and the institutions and policies dealing with international economic

[6] See Abramovitz (1986). This line of thinking has a strong resemblance to a more recent pathbreaking study on the concept of "useful knowledge" by Mokyr (2002), making a distinction between propositional knowledge – which refers to generalised, tested and documented principles of knowledge – and prespective knowledge – which consists of techniques, prescriptions and instructions which reside in human memory, artifacts or storage devices –.

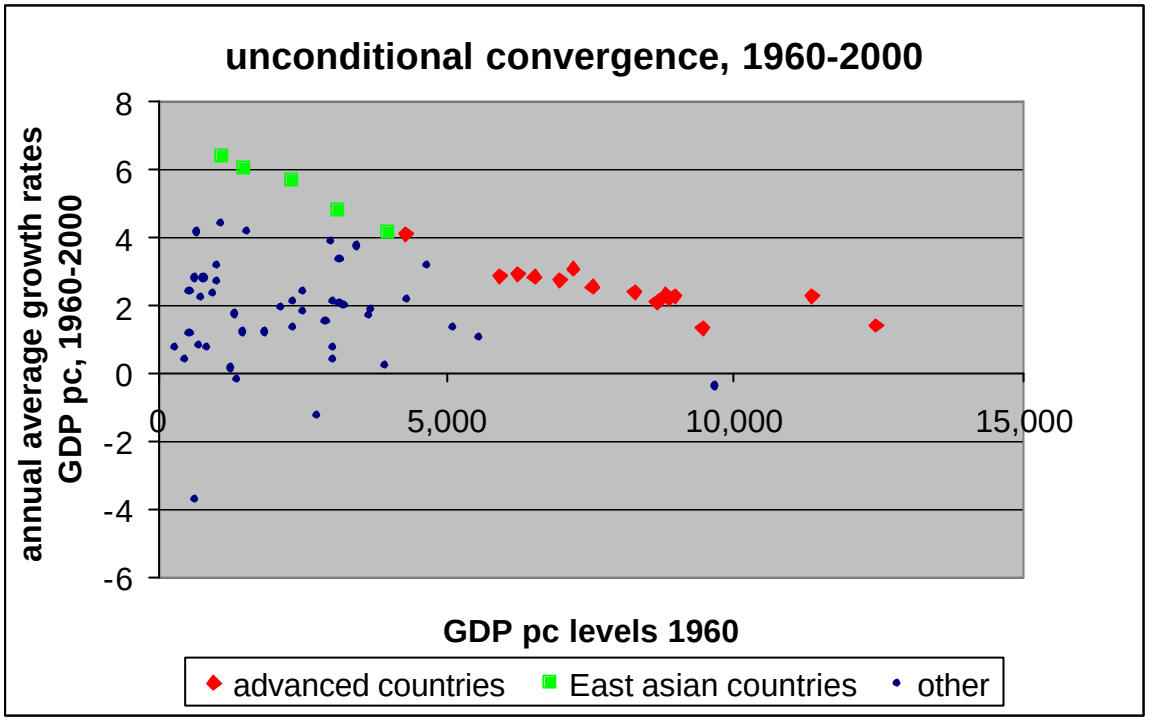
relations (Abramovitz 1991). In summary, the realisation of the potential is highly dependent on the institutional framework of a country.

Although the concepts of potential and realisation may be applied to advanced and developing economies alike, they may be particularly useful for the latter group of countries.[7] The performance of countries that are behind "best practice" in terms of output and productivity performance can be analysed within the framework of the "catch-up and convergence hypothesis" (Baumol 1986; De Long 1988). Based on standard neo-classical growth theory, countries with a low initial income (or productivity) level are assumed to benefit from the implementation of new technologies made available by the technology leader(s). Given initially low levels of capital intensity, and with technology being regarded as freely available and easy to diffuse beyond national boundaries, the focus of economic development policies is on enhancing savings and capital investments. As new vintages of capital will embody the latest technology, they will bring about a renewal of the capital stock at a pace that is faster than in the advanced countries. In addition, developing countries save some of the costs and resources devoted to the research and development executed in the frontier countries.

In this framework, catch-up towards the leader's productivity and output levels will thus follow from initial backwardness. Hence productivity growth rates vary inversely with productivity levels, which necessarily implies that income per capita levels will converge. In other words, the potential for catch-up may be seen as being positively related to the distance towards the leader. From our estimates we learn, however, that although some groups of countries – in particular Western Europe and East Asia – conform to the prediction of unconditional convergence, economic development has spread too sparsely to overcome widespread cross-country inequality (see Figure 2.2).

[7] Incidentally most of Abramovitz' own writings have focused more on advanced than on developing economies, apparently because Abramovitz argued that his framework – as is the case with growth theory in general – required the assumption of a social climate; an assumption which certainly does not hold for many low income economies (Abramovitz 1991, p. 62).

Figure 2.2: Unconditional relationship between per capita income levels (1960) and growth of GDP per capita (1960-2000)



Note: GDP per capita is converted to U.S. dollars with purchasing power parities based on the Geary-Khamis index method.

Source: Groningen Growth and Development Centre; for country detail, see http://www.gggd.net/dseries/totecon.shtml and ILO (2003), KILM 18.

Abramovitz (1986) states that although countries being backward in terms of productivity levels carry a *potential* for rapid advance, we need to look for reasons why countries are backward in the first place. Indeed despite low prices of labour and capital and plentiful technological and market opportunities, there are dozens of considerations that have withheld investors from making investments in low income countries. These can be related to a lack of technical congruence, meaning that the quantity and quality of (certain) factor inputs may be insufficient, or a lack of social capability to exploit the potential.

Table 2.3: Relative Levels of GDP per Capita and Labour Productivity Relative to the U.S., 1960-2000

	GDP per capita (U.S. = 100.0)				GDP per hour worked (U.S. = 100.0)			
	1960	1973	1990	2000	1960	1973	1990	2000
Major Europe (a)	58.8	65.5	63.0	60.0	48.0	66.1	78.4	82.1
Major non-Europe, of which (b)	77.9	88.3	91.8	89.6	71.6	82.5	88.3	90.7
Japan	35.2	68.5	80.9	73.1	26.6	54.2	70.7	74.3
United States	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Transition Economies	32.3	34.2	27.8	18.7	27.9	28.0	24.6	20.4
CEE countries (c)	27.0	29.3	23.9	22.3	19.8	22.5	22.7	26.4
former USSR	34.7	36.3	29.6	14.9	32.6	30.4	32.7	18.3
Asia (d)	6.7	6.1	8.5	10.9	6.0	5.7	7.8	10.4
East Asia	12.5	21.8	43.0	56.4	13.6	20.0	35.6	48.0
South East Asia	10.0	10.3	12.8	13.4	9.2	9.9	11.7	13.0
China	5.9	5.0	8.0	12.1	5.0	4.3	6.3	9.8
South Asia	6.4	5.0	5.5	6.1	5.9	5.3	6.1	7.2
Latin America	29.7	29.2	23.5	21.9	32.5	35.6	30.9	29.7
Africa	8.9	8.3	6.2	5.0	6.9	7.0	6.0	5.0
Middle East	22.0	32.4	20.0	18.8	23.2	38.2	27.3	25.2

(a) excluding transition economies, including Turkey; (b) Australia, Canada, New Zealand, Japan and United States; (c) Central and Eastern European countries, excluding former USSR; (d) excluding Japan

Note: GDP per capita and GDP per hour is converted to U.S. dollars with purchasing power parities based on the Geary-Khamis index method

Source: Groningen Growth and Development Centre (http://www.ggdc.net/dseries/totecon.shtml) and ILO (2003), KILM 18.

Large differences in social capabilities between countries can explain why convergence of GDP per capita levels only applies to a small club of countries and is absent in many others. During the 1980s and 1990s a large body of theoretical and empirical research on economic growth has emerged stressing that convergence is conditional upon factors, such as a critical mass of educated people, a sufficient knowledge base in terms of inventions and innovations that can be codified and protected and a general set of institutions that is growth-conducive at large.[8] Indeed these are major reasons why many OECD countries and countries in East Asia have shown significant convergence as appears from Figure 2.2.

Still it would be too simplistic to assume that factors related to technological and social capabilities are sufficient to explain why some countries converge and other not. Firstly, it ignores that specific factor endowments such as natural resources, population size (domestic markets), geographical location (sea, land) and climate, fertility and amount of arable land can also explain growth differentials (see, for example, Sachs and Warner 1997; Bloom and Sachs 1998; Landes 1998).[9] Secondly, and more importantly, the way in which the potential has been realised in some of the countries that have grown most rapidly in recent times, has in fact been quite different from that in advanced countries. In particular concerning East Asia, there has been an intense debate about the impact of activist government policies on industrialisation and export promotion (World Bank 1993; Amsden 1989). Some studies have also pointed at the existence of a strong developmental state in these countries with authoritarian characteristics focused on centralized decision making (Sen 1999; Dore and Whittaker 2001).

In summary, there appears to be a certain commonality in the technological and social needs for exploiting the growth potential, which are largely related to the technological and social capabilities of a society. The realisation of that potential may be also be dependent on the initial conditions at any time or place. This requires a certain cautiousness with overstating the effects from growth enhancing policies in supporting catch-up and convergence. As is clear from the discussion above the policy implications relate to measures supporting structural change (Chapter 4) and improvements in the institutional design (Chapter 5).

2.3 Long run trends in population and employment

How does the accelerated growth performance of the world economy relate to the dynamics of population and employment growth over the past two centuries? Four main trends in labour input growth can be distinguished:

1) As a result of the unprecedented high population growth, the absolute number of jobs has strongly increased across the world.
2) The growth in jobs has gone together with significant changes in the composition of the labour force between own-account workers, family workers and wage earners, as well as between male

[8] See, for example, Barro and Sala-i-Martin (1995), Knack and Keefer (1995), Aghion and Howitt (1998) and Hall and Jones (1999).

[9] See Easterly and Levine (2002) for a critical account of explanations based on a direct impact of geographic endowments on growth, arguing that such factors only work indirectly through institutions.

and female workers. In particular the female participation rate increased rapidly in many regions during the post World War II period.

3) The intensity of labour in terms of actual working time compared to potential working time has significantly declined over time in advanced countries. This is partly related to changes in labour force participation ratios and to a sharp reduction in working hours per person. In developing countries, however, labour intensity has remained relatively constant.
4) The rise in population and employment growth and the change in composition of the labour force has accounted for a substantial part of output growth in many regions. Population growth has also been a major source of technological change and innovation, and it has raised demand for intermediate and final goods due to specialization and higher incomes respectively.

These four main trends are discussed in more detail below.

ad 1) The demographic transition

One of the most important consequences of the increased potential for growth over the past two centuries, has been the enormous increase in the carrying capacity of this planet. This made it possible not only to feed a much larger number of people but also to raise their living standards in an unprecedented way. Underlying this process is the demographic transition process, which has largely broken the traditional Malthusian view that income rises can only be accommodated temporarily as limited resources bring population growth down to a much lower sustainable growth rates.

The demographic transition in Europe began around 1750, just before the first phase of the industrial revolution. As a result of improved nutrition, better hygienic conditions and higher living standards, (crude) death rates gradually declined below their traditionally "high" levels. As (crude) birth rates in first instance remained considerably above death rates, population growth accelerated (see Table 2.4).[10] But over time birth rates responded and started to decline as well, bringing population growth back to sustained growth rates. In the new demographic equilibrium low birth rates have adjusted to historically low death rates, life expectancy has roughly doubled and population size and density are much larger. In most advanced countries population growth is now quite stable at less than 1 per cent on average per year. In developing countries the transition began later. Many East Asian countries have already gone through the various stages of demographic transition, but others are still in the midst of the transition stages with continued high birth rates and death rates which have significantly fallen over the years.

[10] Here we abstain from the effects of migration, although migration has also been an important force of population growth in parts of the western world for periods of time, notably North America and Oceania.during the 18th and 19th centuries.

Table 2.4 The demographic transition: average birth and death rates and population growth rates, 1870-1990

	1870-1913			1950-1973			1973-1998		
	birth rates	death rates	population growth	birth rates	death rates	population growth	birth rates	death rates	population growth
World			0.8	34.7	15.5	1.9	25.9	9.9	1.7
Major Europe (a)			0.8	18.8	10.1	0.8	12.9	7.4	0.3
France	22.5	22.0	0.2	17.9	11.5	1.0	13.5	9.7	0.5
Norway	29.2	15.9	0.8	17.5	9.2	0.8	13.2	10.3	0.5
Spain (b)	34.8	28.4	0.5	20.6	9.1	1.0	9.1	8.4	0.5
United Kingdom	31.2	18.7	0.9	16.5	11.7	0.5	13	11.4	0.2
Major non-Europe									
United States (c)	29.1	15.0	2.1	20.9	9.4	1.5	15.4	8.8	1.0
Japan	29.4	20.3	1.0	19.2	7.7	1.2	11.6	6.6	0.6
Australia	31.9	13.6	2.4	21.4	8.9	2.2	15.0	7.3	1.3
Asia (d)			0.6	38.9	17.4	2.2	26.5	9.1	1.9
Korea			0.3	36.8	12.6	2.2	18.2	6.1	1.3
China			0.5	36.6	16.0	2.1	19.7	6.9	1.4
India (e)	39.2	30.3	0.4	42.3	31.4	2.1	31.4	11.5	2.1
Latin America			1.6	39.5	12.6	2.7	28.0	7.4	2.0
Mexico (f)	33.6	32.7	1.1	44.7	12.8	3.1	30.0	6.0	2.2
Chile	39.4	31.3	1.4	34.0	11.7	2.1	22.4	6.1	1.6
Africa			0.8	48.1	22.9	2.3	42.7	15.5	2.7

Birth rates is annual number of births per 1000 inhabitants; death rates is annual number of deaths per 1000 inhabitants

(a) 1870-1913: Western European countries only, excluding East Europe and Turkey

(b) 1870-1913 birth and death rates annual average of 1878-1913

(c) White Americans only; 1870-1913 birth rates annual average of 1909-1913; death rates annual average of 1900-1913; black Americans death rates 1870-1913 is 23.6

(d) population growth Asia, excl. Japan

(e) 1870-1913: birth and death rates annual average of 1911-1913

(f) 1870-1913 birth and death rates annual average of 1900-1910

Source: 1870-1913: Crude birth and death rates 1870-1913 from Mitchell, 2nd ed.

1950-1998: Crude birth and death rates from UN population prospects (1950-1975 and 1975-2000)

Population growth rates from Maddison (2001) and UN population prospects

Table 2.5: Population size and age distribution, 1870-2000

	1870 (population size, %)				1950 (population size, %)				1975 (population size, %)				2000 (population size, %)			
	x1000	0-14	15-64	65+	x1000	0-14	15-64	65+	x1000	0-14	15-64	65+	x1000	0-14	15-64	65+
Major Europe	239,714				547,403	26.2	65.6	8.2	675,542	23.7	64.8	11.4	727,986	17.5	67.8	14.7
Austria	4,520	42.3	55.9	1.8	6,938	22.8	66.8	10.4	7,581	22.8	66.8	10.4	8,101	16.7	67.8	15.5
Denmark	1,888	33.4	60.8	5.8	4,269	26.3	64.6	9.1	5,060	22.6	64.0	13.4	5,322	18.3	66.7	15.0
France	38,440	27.1	65.5	7.4	41,836	22.7	65.9	11.4	52,716	23.9	62.6	13.5	59,325	18.8	65.2	16.0
Italy	27,888	32.5	62.4	5.1	47,125	26.3	65.4	8.3	55,473	24.2	63.7	12.1	57,560	14.3	67.6	18.1
Hungary (a)	5,717	37.0	60.1	2.9	9,334	25.1	67.6	7.3	10,539	20.3	67.0	12.7	10,009	17.0	68.4	14.6
Poland	17,240				24,817	29.4	65.4	5.2	34,038	24.0	66.4	9.6	38,696	19.2	68.6	12.2
Major non-Europe																
USA	40,241	39.2	57.8	3.0	157,878	27.0	64.7	8.3	220,014	25.2	64.4	10.4	285,056	21.8	65.9	12.3
Australia	1,770	42.3	55.9	1.8	8,216	26.5	65.4	8.1	13,905	27.6	63.7	8.7	19,152	20.5	67.2	12.3
Asia	765,056				1,398,488	36.5	59.4	4.1	2,397,512	39.6	56.2	4.2	3,679,737	30.4	63.7	5.9
China	358,000				554,866	33.5	62.0	4.5	927,809	39.5	56.1	4.4	1,275,934	24.8	68.3	6.9
India	253,000				357,754	38.9	57.7	3.4	620,526	39.8	56.4	3.8	1,017,806	34.1	60.9	5.0
Japan	34,437	33.7	61.0	5.3	83,672	35.4	59.6	5.0	111,545	24.3	67.8	7.9	127,005	14.6	68.2	17.2
South Korea	14,347				18,850	41.7	55.3	3.0	35,314	37.7	58.6	3.7	46,821	20.9	72.0	7.1
Phillipines	5,063				19,999	43.6	52.8	3.6	42,031	44.2	52.7	3.1	75,767	37.5	58.9	3.6
Latin America	39,973				167,097	40.0	56.3	3.7	321,906	41.3	54.4	4.3	520,229	31.9	62.6	5.5
Brazil (b)	9,797	32.9	61.8	5.3	53,933	41.6	55.5	2.9	108,136	40.3	55.8	3.9	171,856	29.3	65.5	5.2
Chile (c)	1,943	40.8	56.4	2.8	6,085	36.7	59.0	4.3	10,343	36.8	57.8	5.4	15,232	28.4	64.3	7.3
Peru	2,606				7,627	41.6	55.0	3.4	15,169	43.2	53.2	3.6	25,964	34.5	60.7	4.8
Colombia	2,392				12,575	42.6	54.2	3.2	25,382	43.4	53.0	3.6	42,087	32.8	62.5	4.7
Africa	90,466				221,214	42.0	54.8	3.2	408,160	45.1	51.8	3.1	795,671	42.7	54.1	3.2
Nigeria					29,793	41.7	55.3	3.0	54,893	45.0	52.0	3.0	114,811	45.0	51.9	3.1
Ghana					4,902	45.1	52.4	2.5	9,910	45.9	51.4	2.7	19,587	41.4	55.7	3.2
Egypt					21,820	39.7	57.4	2.9	39,328	40.9	54.9	4.2	67,818	36.3	59.2	4.5
World					2,518,629	34.3	60.5	5.2	4,068,109	36.8	57.6	5.7	6,070,581	30.1	63.0	6.9

(a) 1869; (b) 1873; (c)1895

Sources: Population size and age distribution in 1870 from Maddison (1982, 2001), 1950-2000 from UN Population Prospects

As a result of the changes in birth and death rates, the demographic transition has also led to major changes in the age distribution of the population (Table 2.5). Increased health and hygiene meant that life expectancy increased from less than 40 years at the beginning of the 19th century to almost 80 years by the end of the 20th century (Maddison 2001, Table 1.5b). The demographic transition also significantly extended the working lifetime of people, which was supported by an improvement in working conditions. As the number of people above 65 increased as well, arrangements such as pension schemes were set up to provide elderly people with an income.

During the past decades, the demographic transition has also been a cause of concern with respect to the "population problem" that several developing countries presently face. Indeed there is a substantive literature that argues that the carrying capacity of the planet cannot sustain a population of 6 billion or more because of the exhaustion and dispersion of a one-time inheritance of natural capital, including topsoil, groundwater, and biodiversity (Daily and Ehrlich 1992).

To resolve the apparent conflict between the positive and negative effects of the demographic transition one should stress that it is not population growth as such but underpopulation and overpopulation relative to the potential resources that is the core of the problem. Underutilisation of potential resources can hamper development, and so does overexploitation of scarce natural and material resources. In both cases lack of innovation and technological change is often the main problem. In situations where the potential for growth is seriously limited, or where the realisation of the existing potential is negatively affected by policy mistakes, economic uncertainty, civil insecurity or warfare, population growth can become a serious threat to even maintain a minimum level of subsistence. It can lead to countries being trapped in a mode of high population growth rates, "eating away" the minimum resources needed to create the technological and social capabilities. This creates a trade-off between, on the one hand, faster population growth and creation of unproductive and bad jobs and, on the other hand, a slowdown in income and productivity growth. The ultimate challenge is to break that vicious circle; an issue we will return to in Chapter 3.

ad 2) The composition of employment

Under the influence of the demographic transition the composition of the labour force has changed in an important. Using the distinction of employment in paid employees, own-account workers and unpaid family workers, the relative share of paid employees in total employment has strongly increased at the expense of self-employed and unpaid family workers (see Table 2.6).

Table 2.6: Employment Status in Agriculture and non-Agriculture

		Crude Activity Rate (a)	Agricultural Sector			Non-Agricultural Sectors			Ratio of own account workers to wage earners
			own accounts workers	wage earners	family workers	own accounts workers	wage earners	family workers	
Germany, Fed.Rep	1950	46.3	1,252,395	1,128,594	2,732,743	2,005,920	14,502,708	451,647	0.17
Germany, Fed.Rep	1990	50.2	389,000	227,000	375,000	1,090,000	27,127,000	170,000	0.05
Netherlands	1947	40.2	251,875	242,189	253,420	467,954	2,402,722	150,048	0.26
Netherlands	1994	46.6	131,000	108,000	25,000	596,000	5,770,000	62,000	0.11
Portugal	1950	39.0	439,773	950,592	173,550	240,739	1,344,662	25,650	0.20
Portugal	1992	48.2	376,000	104,000	49,800	706,100	3,424,100	32,000	0.22
Turkey	1955	50.7	2,642,915	244,235	6,551,849	685,652	1,380,068	116,933	0.58
Turkey	1990	31.1	3,370,900	582,048	8,594,745	2,146,437	8,408,679	276,532	0.29
United States	1950	39.9	4,385,794	2,031,646	913,913	5,187,543	47,263,303	199,057	0.11
United States	1994	45.8	1,729,000	2,083,000	50,000	9,213,000	117,241,000	136,000	0.08
Indonesia	1964	35.3	12,649,000	4,992,000	6,840,000	4,782,000	4,909,000	1,186,000	1.22
Indonesia	1992	49.1	20,191,581	5,038,455	16,818,163	14,156,720	17,733,415	3,630,064	1.00
Philippines	1965	41.5	2,979,000	826,000	2,247,000	1,343,000	2,848,000	291,000	0.57
Philippines	1994	47.3	5,802,000	2,368,000	3,078,000	4,139,000	9,100,000	678,000	0.53
South Korea	1966	29.7	2,213,080	440,890	1,898,600	1,011,670	2,123,530	274,800	0.61
South Korea	1993	.	1,662,000	197,000	986,000	3,790,000	11,500,000	1,068,000	0.42
Thailand	1960	52.7	3,455,337	352,853	7,526,087	673,055	1,279,833	456,749	0.88
Thailand	1994	46.4	5,745,600	2,193,900	4,460,900	3,941,800	10,308,500	1,582,600	0.54
Mexico	1960	32.4	2,686,833	3,296,465	100,828	1,193,836	3,965,161	10,174	0.30
Mexico	1991	37.5	3,942,974	1,981,744	2,246,565	5,669,406	14,895,825	1,722,080	0.50
Chile	1960	32.4	165,315	443,752	52,743	316,643	1,295,869	12,184	0.25
Chile	1994	24.7	300,840	446,130	61,940	1,097,770	2,976,540	105,000	0.40
Egypt	1947	34.1	1,535,553	1,426,761	1,152,228	878,821	1,325,493	122,689	0.76
Egypt	1992	29.2	2,130,800	1,191,900	2,212,200	1,769,100	6,714,200	380,800	0.32

Employment as % of working age population

Note: see appendix. Source: ILO, *Yearbook of Labour Statistics*, tables 1, 2A; various issues.

Two main developments account for the change towards a larger share for wage earners. Firstly, the share of agriculture in the total economy, in which own-account workers and unpaid family workers are traditionally highly represented, declined. Secondly, self-employed people who ran one-person businesses in all sectors of the economy are to a large extent replaced by more efficient large-scale production organisations hiring wage employment. Although there is a small counteracting effect from an increasing amount of self-employed entrepreneurs in business and financial service industries in advanced economies, this effect is small compared to the overall decline in own-account workers.

Three additional effects underlying the employment transformation process need to be addressed. Firstly, economic growth has significantly reduced *underemployment.* Underemployment means that people cannot raise sufficient income from a fulltime job. Hence their capabilities, talents and skills are underutilized. However, despite its decline, underemployment has not vanished, in particular not in the urban informal sector of developing economies. Although the remaining number of underemployed persons is not easily obtained from labour statistics, a large share of self-employed people in manufacturing, commerce and services are an indication of underemployment and the existence of an informal economy. Relatively high rates of self-employed people to paid employees in the non-agricultural sector can serve as a good proxy for the extent of informal economy employment (see last column of Table 2.6). The issue of informal sector activity and its impact on productivity growth is discussed in more detail in Chapter 4.

A second important change in the composition of the labour force concerns the *age distribution*. This issue is partly directly related to the demographic transition discussed above, but also relates to the lengthening of the education period of young people and the development of pension schemes for elderly people. As a result the labour force in advanced countries is concentrated in the age group 25-64. This in itself has significantly raised productivity growth, as elderly people and children usually are less productive then adults in the middle-age group. It has also contributed to a better quality of jobs, for example through the decline in child labour.

A third important development in the composition of the labour force concerns the changes in the share of *female participation*. Table 2.7 shows the female labour force participation rates, which are defined as the percentage share of the female labour force in the total female working age population from 15-64 years, along with the male participation rate.[11] With regard to interpreting female participation rates some caution is required. In most developing countries women always contributed to family income, but much of it is carried out as informal labour. The labour statistics can easily understate their numbers. In the developed world, women with a paid job capture a larger share of total formal employment.

[11] The rate is affected by enhanced education of women in the age group of 15-24.

Table 2.7: Crude male and female activity rates

Male and female activity rates	1950		1990	
	Male	Female	Male	Female
World	61.57	34.09	56.56	38.18
More developed	61.18	30.60	57.32	41.66
Europe	62.04	32.55	56.22	40.90
Northern America	61.44	23.47	57.27	44.18
Oceania	62.35	22.47	57.03	40.14
Less developed	61.74	35.87	56.36	37.17
Asia	62.44	38.19	57.95	39.63
Turkey	62.09	52.76	55.91	30.34
Africa	57.55	36.60	50.97	33.56
Northern Africa	57.63	16.87	49.23	19.08
Latin America and Caribbean	58.08	14.20	54.28	25.91

Source: ILO, Economically Active Population, *1950-2010*

The table shows a rapid rise in female participation in the Western world from just over 30 per cent in 1950 to 42 per cent in 1990. In developing countries the female participation only slightly improved over the past half century, although the rate was higher than in developed countries in 1950. Asia has a much higher female participation rate than Latin America, which is partly accounted for by the higher population density and larger agricultural sector in Asia. In low income economies with a relatively large share of industry and services and a high urbanization rate, female participation is restricted as large families occupy women with housekeeping and childcare. In Latin America the female participation rates were quite low in the 1950s but caught up considerably during the past decades. In Africa the female activity rate declined, which was the result of the biased age distribution in that region towards young people below 15 years old. In addition to the reasons mentioned above, the low female participation rates in Arabic countries are also related to cultural factors although the share of women has increased modestly.

An important conclusion of this discussion is that changes in the composition of the labour force have had a direct impact on the development of productivity and income. The process of industrialisation, the rise of wage-dependent employment, the fall in underemployment, the concentration of the workers in the age group of 25 to 64 and the increase in female participation contributed to the creation of more productive jobs and brought an increasing number of people out of poverty. The important question that remains is what the main reasons are that sparked off this transformation, and why – despite the overall trend of the past two centuries towards more productive and decent jobs – not all countries have been able to realise this transformation in a similar way. The focus on the quality of jobs sheds light on this issue, which will be discussed in more detail in Section 2.4 as well as in Chapters 3 and 4.

ad 3) The development of labour intensity

Although trends in population and employment growth are strongly related, a more detailed analysis suggests that labour intensity, measured as the total number of hours worked relative to a maximum potential number of working hours that the working population can put in, has significantly declined

over time. Two major indicators are of importance, namely the number of hours worked per person employed and the labour force participation ratio.

Despite rapid employment growth, there has been a trend towards a strong decline in average annual working hours per person employed, in particular in OECD countries. Actual hours worked depend on regular paid hours, overtime, but also on various types of off-time, including time due to holidays and vacations, sickness and industrial disputes. Average annual hours also depend on the degree of part-time labour in the economy and on the female participation rate (as women work more part-time than men).[12]

Table 2.8 shows the number of hours worked by per person employed. In Europe and the rest of the OECD annual working hours declined by 1,000 hours between 1870 and 2000. Most of the decline during the early decades partly represented the shift from agriculture to non-agriculture and the introduction of labour laws that reduced working hours in factories. Between 1960 and 1975, the free Saturday was introduced in most countries. Since 1975 the further decline in working hours was caused by work time sharing, an increase in the number of holidays and vacation time and – in particular during the 1990s – a strong rise in parttime labour. The recent decline in working hours, however, seems largely a European phenomenon as working hours in advanced countries outside Europe have not declined as rapidly. Indeed the gap in average working hours between Europe and the rest of the OECD is now much bigger than before.

[12] For example, due to the high amount of part-time jobs brought about by a large inflow of women on the labour market since the 1970s, the average working year in the Netherlands consisted of 1324 hours in 2002, which is among the lowest figure in the world. In many developing countries average annual working hours are almost double this amount.

Table 2.8: Average Annual Hours Actually Worked per Person Employed

	1870	1913	1960	1975	2000
Major Europe (a)	2911	2483	2094	1886	1622
Major Non-Europe (b)	2939	2605	2002	1924	1843
Transition Economies			2082	2007	1997
Asia					
East Asia (c)			2426	2510	2405
SE Asia (d)			*2200*	*2200*	*2208*
China (d)			*2200*	*2200*	2200
South Asia (d)			*2200*	*2200*	2173
Latin America			2131	2066	1920
Africa			*2200*	*2200*	*2200*
Middle East			*2200*	*2200*	*2200*
World			2155	2120	2099

(a) excluding transition economies; 1870 and 1913 also excluding Greece, Ireland, Portugal, Turkey and Spain; (b) Australia, Canada, Japan and United States; from 1960 onwards also including New Zealand; (c) South East Asia, South Asia, China and Africa are assumed at 2,200 hours

Source: 1870 and 1913 from Maddison (1991); 1960-2000 from Groningen Growth and Development Centre (*http://www.ggdc.net/dseries/totecon.shmtl*)

The quality of the estimates of working hours for developing countries are much weaker than for advanced countries. Given the fact that working hours in East Asia were not much higher than 2,500 hours even during the 1960s, it is unlikely that today's working hours for other countries are much higher than that. However, there are no signs of a similar fall in working hours as in western countries. [13]

Apart from a decline in working hours per person, the share of persons in the labour force (or economically active population) as a percentage of all persons at working age 15-64 has also declined, at least until the mid 1970s.[14] Table 2.9 shows that labour force participation declined in most advanced countries between 1870 and 1960. This decline is mainly a reflection of a decline in unpaid family work (in particular women) and child labour (see below under ad 2)). Outside Europe the

[13] This is supported by infomation for those countries for which we have reasonable data in 1960 and 2000. In Argentina average working hours decreased slightly from 2,073 to 1,903 hours and in Mexico from 2,150 to 2,058 hours. In South Korea even an increase took place from 2,235 hours in 1960 to 2,487 hours in 2000, although a substantial decline was reported for Taiwan from 2,772 hours in 1960 to 2,282 in 2000. But for the developing countries together and for the world as a whole the fall in working hours per person is probably not very big.

[14] Alternatively we could also look at the employment/population ratio (defined as the crude activity rate), but the labour force participation rate excludes effects of differences in formal unemployment rates (which is the difference between employment and labour force) and the share of the age groups from 0-15 years and 65 years and older in the total population. To account for the effect of declining labour force participation rates due to increased education a comparison of labour force to the population of 25-64 years is a possible alternative.

labour force participation remained somewhat higher during the period, but this is mainly due to the considerably higher participation rates in Japan.

Table 2.9: Labour Force Participation Rates (labour force/population 15-64)

	1870	1913	1960	1975	2000
Major Europe (a)	0.744	0.705	0.687	0.677	0.707
Major non-Europe (b)	0.748	0.735	0.683	0.679	0.776
Transition Economies			0.758	0.764	0.757
Asia			0.855	0.801	0.799
East Asia (c)			0.619	0.614	0.717
SE Asia			0.732	0.694	0.762
China			0.949	0.890	0.869
South Asia			0.793	0.738	0.739
Latin America			0.622	0.593	0.681
Africa			0.813	0.764	0.768
Middle East			0.619	0.548	0.528
World			0.782	0.749	0.769

(a): Excluding Transition Economies; 1870 and 1913 exclude Greece, Ireland, Portugal, Turkey and Spain
(b): Australia, Canada, Japan & United States; from 1960 onwards also incl. New Zealand
(c): excluding Japan
Source: Population 15-64 for 1870 and 1913 from Mitchell; for 1960-2000 from UN World Population Prospects, Age Distribution, 1950-2000; Labour force for 1870 and 1913 from Maddison (1982); for 1960-2000 from World Bank, World Development Indicators

Between 1960 and 1973 labour force participation rates have declined almost everywhere in the world economy. In the advanced countries the decline was more moderate than before, although there was a substantial variation around the average of 67 to 68 per cent.[15] In developing countries the expansion at the base of the population pyramid accounts for much of the slowdown in labour force participation between 1960 and 1973, in particular as schooling of young people in the age group 15-24 years old increased substantially. The fastest decrease in labour force participation rates between 1960 and 1973 took place in China and South Asia, but remained at much higher levels than in Latin America and Africa.

Since 1973 labour force participation rates have increased again. In the OECD countries this is related to a range of factors including a reform of welfare systems in many countries bringing more people back into the labour force, a rise in parttime labour and an increase in female participation rates. Female participation rates have also risen in many developing economies, so that participation rates increased in East and Southeast Asia and in Latin America. But with a continuous large young

[15] For example, labour force participation rates in some Southern European countries, but also in Belgium and the Netherlands fell to below 60 per cent, whereas they remained relatively high in Scandinavian countries and the United Kingdom. Although Japanese participation rates also came down during this period, they remained high at around 72 per cent.

generation, the activity rates in other parts of the developing world have remained relatively low. When fertility rates fall under the replacement rate of 2 children per women, the activity rate will ultimately increase. Only the transition economies and the Middle East experienced a continued fall in labour force participation rates, which was related to the transition process and to the cultural reasons respectively.

By combining the information from Tables 2.9 and 2.10 a rough estimate can be made of labour intensity by dividing the total number of hours worked relative to the maximum possible number of hours worked, which was put at 2,800 hours per year, times the total working age population of 15-64. The 2,800 hours estimate was obtained by assuming a 52-week working year at 6 days of 9 hours per week. Obviously this maximum number should not be interpreted as a desirable standard that should be aimed for. However, when relating the actual number of hours to the maximum potential some important observations can be made (Table 2.10).

Firstly, whereas in 1870 the actual labour input was as little as 20 to 35 per cent below the maximum labour input, it was more than 50 per cent lower by the end of the 20th century. Indeed workers in the advanced world have traded off working time for leisure in a big way, which surely has contributed enormously to the quality of life in general and – more specifically – to the quality of jobs. Since 1975, however, labour intensity has somewhat increased again in the OECD countries outside Europe, but the decline has continued within Major Europe. Indeed this suggests that the trade-off between work and leisure is perceived somewhat differently within the group of advanced countries.

The transition economies have experienced the largest decline in labour intensity during the last quarter of the 20th century. In contrast to other industrialised countries, labour intensity in the European socialist economies substantially increased during the 1950s and 1960s. Hence the decline since the 1970s is partly a correction, but the negative employment record during the reform period is the main reason for the strong decline in labour intensity.

The differences in labour intensity within the developing world are large. Strikingly actual versus maximum labour input in Africa and East Asia today is not much lower than it was in Europe and the U.S. in 1870. Hence it is hard to imagine that these two regions can raise labour intensity much more in purely quantitative terms. In contrast, labour intensity in Latin America and the Middle East is much lower, so that there is more potential for an increase in labour force participation.

Table 2.10: Labour Intensity (actual total hours to maximum total hours of working age population)

	1870	1913	1960	1975	2000
Major Europe (a)	0.668	0.550	0.528	0.456	0.441
Major non-Europe (b)	0.790	0.638	0.458	0.437	0.477
Transition Economies			0.531	0.572	0.436
Asia					
East Asia (c)			0.598	0.673	0.742
SE Asia			0.529	0.496	0.533
China			0.602	0.552	0.595
South Asia			0.502	0.438	0.456
Latin America			0.443	0.394	0.386
Africa			0.708	0.666	0.670
Middle East			0.487	0.434	0.427
World			0.561	0.533	0.559

Note: (employment * actual hours worked) as % of (population 15-64 * 2,800 hours per year)
(a): Excluding Transition Economies; 1870 and 1913 exclude Greece, Ireland, Portugal, Turkey and Spain
(b): Australia, Canada, Japan & United States; from 1960 onwards also incl. New Zealand
(c): excluding Japan
Source: Tables 2.8 and 2.9

ad 4) Employment and productivity growth

How did the acceleration in population growth and the changes in the composition of employment and in labour intensity rates, described above, affect output and productivity growth? The demographic transition process initially raised the share of the age-group below 15 years old due to continued high birth rates (in combination with a decline in child mortality). Depending on whether the young population could be well educated and whether there was growth potential that could be realised, by the time these youngsters entered the labour force they turned out to be a demographic gift or a demographic burden. Table 2.11 shows that productivity was the main source of output growth in the industrialising nations of the Western world from 1870-1913. Still labour force growth accounted for up to 20 per cent of output growth in Europe, and almost 50 per cent in North America. East Asia also experienced a demographic gift from 1960 to 1973 and Southeast Asia from 1973 to 1990 when rapid labour growth and output growth coincided.

Table 2.11: Percentage contribution of labour force to output growth by major region, 1870-2000

	Total hours growth as % of real GDP growth			
	1870-1913	1960-1973	1973-1990	1990-2000
Major Europe (a)	17%	-6%	-4%	8%
Major non-Europe, of which (b)	43%	30%	46%	34%
Japan	45%	13%	23%	-45%
United States	44%	39%	56%	51%
Transition Economies		42%	-4%	82%
CEE countries (c)		15%	-1%	-129%
former USSR		55%	-5%	8%
Asia (d)		49%	47%	27%
East Asia		43%	37%	24%
South East Asia		43%	59%	39%
China		66%	41%	21%
South Asia		46%	57%	35%
Latin America		41%	85%	63%
Africa		48%	89%	106%
Middle East		28%	126%	81%
World		21%	81%	39%

(a) excluding transition economies, including Turkey; (b) Australia, Canada, New Zealand, Japan and United States; (c) Central and Eastern European countries, excluding former USSR; (d) excluding Japan

Source: from 1960 onwards, see table 2.2; 1870-1913 from Maddison (1991).

In many developing countries the demographic transition has severely biased the age structure. In some developing countries the age group of 0-14 makes up more than 40% of total population, and the age group 0-24 has reached levels of over 60 per cent of total population. Since 1973 labour force growth contributed most to output growth in Latin America, Africa and the Middle East. In some cases labour input even grew faster than output. But as output growth rates remained low, the potential demographic gift turned into a demographic burden in the regions. Indeed the larger gap between birth and death rates in developing countries has raised substantial problems because the opportunities for creation of productive employment have remained limited.

When assessing the impact of the demographic transition on output and productivity it is also useful to make a distinction between growth rates and levels. The *absolute level of the population* mainly relates to the density of population which primarily reflects structural factors of an economy. In a broad sense, population pressure stimulates human creativity to respond to eventual oversupply of labour. For example, the increase in population density has been an important driver of labour-intensive innovations in agriculture (such as weeding, manure, irrigation, etc.), which has significantly reduced fallow periods on land. Hence it strongly increased the carrying capacity of traditional

agriculture both in terms of increased food production and a rise in employment opportunities for the rural population (Boserup 1965).[16] A higher population density also raises the payoff of infrastructure projects, such as road and rail, to move goods (trade) and people (migration) between densely populated regions. This has greatly contributed to increased specialization, which is an important determinant of growth. Finally, higher population density also means a concentration of human resources that leads to the creation of knowledge pools which are at the roots of formal and informal invention and innovation by human mankind (Boserup 1981; Simon 1996). The size of the domestic market also affects the opportunities to exploit economies of scale, and the choice between specialization on the basis of comparative advantage or the creation of a more diversified industrial structure.

The *growth rate of the population* is primarily of interest from the perspective of its impact on productivity growth and living standards. Parallel to the growth in population, various other factors, such as changes in sexual behaviour, the introduction of new contraceptive technology, urbanization, the penetration of modern ideologies and enhanced social mobility of women, have contributed to the virtuous circle of smaller family units, a decline in poverty, higher incomes and increased consumption, leading to new opportunities for employment growth and income generation. Moreover, even though the absolute level of consumption has increased, the share of consumption in total GDP has usually fallen when income rise. Although the relationship is far from perfect, richer countries devote higher proportions of their national incomes to savings, which ultimately increases public and private investment and raises output and productivity growth (McGuckin, van Ark and Barrington, 2000).

What are the implications of a change in labour intensity for productivity growth? Unfortunately, there is still little evidence which looks directly at this relationship, but it is likely that there are various factors playing a role. In advanced countries, low labour intensity in Europe may well have had a positive impact on productivity growth as high wage cost have led to a substitution of capital for labour and a big degree of layoff of low-skilled workers. At the same time, however, much of the rise in part-time work is located in service industries, which are often characterised by slower productivity growth than manufacturing industries. Moreover under the influence of rapid technological change and more flexible labour markets, the U.S. economy has been more successful in raising productivity during the 1990s despite a slower decline in hours than in Europe.

In low-income countries low labour intensity may be a sign of insufficient potential for growth, restricting productivity growth. On the other hand, however, high labour intensity (such as in Africa), with most labour remaining concentrated in agriculture and handicraft industries, is rather a sign of lack of structural change than of a realisation of opportunities. Hence it is necessary to take a better look at changes in the composition of labour and the quality of jobs.

[16] This pattern of innovation does not immediately lead to higher labour productivity growth as it mainly caters for more people working the land to produce more output. Hence the Boserupian type of innovation mainly supports extensive growth, although it does raise the productivity of land.

2.4 The Role of Human Capital

Apart from the expansion of employment and changes in the composition of workers, the work content and work environment also changed fundamentally in broad segments of the world economy during the past two centuries. Job content changed in response to increased efficiency, economies of scale and major technological and organisational changes.

To describe the change in the quality of jobs in the long term, the primary focus must be on the improvements in health and education of the population and the labour force, which have been essential to enhance human welfare and economic development. In particular the substantial lengthening of life expectancy has greatly improved the quality of life in general, and that of job content more specifically. A longer expected lifetime increases the future returns on education and makes it worthwhile to at least temporarily give up working time and earnings in order to improve skills and raise earnings capacity for the future.

The most widely available evidence on the improvements in education and health comes from the increase in life expectancy at birth and the rise in literacy rates. Nowadays both indicators are used – together with GDP per capita – in the Human Development Index of the United Nations. From a historical point of view, the improvement in these indicators has been unprecedented.[17] Life expectancy for the world as a whole increased from 26 years in 1820 to 49 years in 1950 and 66 years in 1999. In most advanced countries it went up to close to 80 years, but even in the developing world it increased to well above 60 years, except for some regions, for example Africa – where it is still on 52 (Maddison, 2001, p. 30). Literacy rates have also strongly improved although there is much variation in particular in the developing world, where it ranged between as low as 50 and more than 90 per cent (see Table 2.12). Moreover, there is a striking difference between literacy rates of men and women in many countries, which directly links back to the discussion above on the variation in female participation rates across countries.

To measure the impact of health and education on productivity, one may perceive the effort to obtain education as an investment that contributes to the creation of human capital. Human capital may be defined as: "The knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being" (OECD, 2001, p. 18).[18] Although the overall evidence clearly points towards larger stocks of human capital over the past two centuries, the measurement issues are substantial.

[17] See also Crafts (2002).

[18] Except from its impact on economic growth, education can also be seen as a means of greater personal fulfilment, as an instrument for social continuity and cohesion or as support to social mobility (Maddison 1974). In more recent work the concept of social capital has been introduced as a strong complementary factor to human capital. Whereas human capital reflects an investment that is primarily made and is largely appropriated by the individual, social capital deals with social relationships, norms of behaviour and mutual trust in many kinds of social and economic activities (OECD, 2001).

There are essentially four ways to measure human capital. Due to its wide availability, the first measure of schooling is the *enrolment in education* is mostly used.[19] However, there are major problems with this measure due to definitional problems and because enrolment is a measure of input rather than output of the education system. It measures the efforts to obtain education, but it does not tell us much about the output from the education process. Moreover it takes time before investments in education will yield their expected returns.

Table 2.12: Literates as % of Adult Population (15+)

	Female			Male		
	1970	2000	increase (%-point)	1970	2000	increase (%-point)
South and Eastern Europe						
Greece	79.2	96.0	16.8	94.7	98.5	3.8
Spain	88.2	96.8	8.6	95.2	98.6	3.4
Romania	89.7	97.2	7.5	97.0	99.0	2.0
Croatia	85.5	97.3	11.8	97.5	99.3	1.8
Asia						
China	35.6	76.3	40.7	66.2	91.7	25.5
Indonesia	44.0	82.1	38.1	68.9	91.9	23.0
South Korea	80.1	96.4	16.3	93.7	99.1	5.4
Malaysia	46.1	83.5	37.4	70.3	91.4	21.1
Viet Nam	72.3	91.4	19.1	91.1	95.5	4.4
India	18.5	45.4	26.9	46.8	68.4	21.6
Latin America						
Argentina	92.3	96.8		93.6	96.9	
Bolivia	45.8	79.4	33.6	70.4	92.1	21.7
Chile	87.2	95.5	8.3	89.3	95.9	6.6
Uruguay	93.4	98.2	4.8	92.5	97.4	4.9
Mexico	69.8	89.4	19.6	80.0	93.3	13.3
Guatemala	37.3	61.3	24.0	53.0	76.2	23.2
Africa						
Cote d'Ivoire	6.4	38.8	32.4	24.7	54.9	30.2
Nigeria	10.2	55.8	45.6	30.6	72.4	41.8
Malawi	19.6	46.5	26.9	58.1	74.5	16.4
Uganda	21.5	56.9	35.4	51.4	77.6	26.2
Zimbabwe	48.9	84.7	35.8	66.2	92.8	26.6
Middle East						
Morocco	8.1	36.1	28.0	31.7	61.9	30.2
Saudi Arabia	17.1	67.2	50.1	51.9	84.1	32.2
Yemen	2.3	25.2	22.9	26.8	67.5	40.7

Source: UNESCO, Global Education Database

The second measure therefore focuses on the output of the education system by looking at the *educational attainment of the labour force* (or working age population) which can be measured as the

[19] See, for example, UNESCO, *Global Education Database* (http://qesdb.cdie.org/ged/index.html).

years of education per individual, if possible corrected for the composition of primary, secondary and tertiary education. Table 2.13 shows the average years of education for a selected number of advanced and developing countries, showing the important progress made in both advanced and developing countries.

Table 2.13: Years of Education per Person of 15 years and older

	1913	1950	1973	1984
France	7.0	9.6	11.7	13.7
Germany	8.4	10.3	11.6	11.9
Japan	5.4	9.1	12.1	13.6
United Kingdom	8.1	10.8	12.1	13.1
United States	7.9	11.3	14.1	16.2
OECD Average	7.3	10.2	12.3	13.7
China		2.2	4.0	5.7
India		1.4	2.6	3.9
South Korea		3.4	6.8	11.4
Taiwan		3.6	7.4	12.6
Asian average		2.6	5.2	8.4
Argentina		4.8	7.0	9.3
Brazil		2.1	3.8	5.6
Chile		6.1	8.0	9.8
Mexico		2.6	5.2	7.1
Latin American average		3.9	6.0	7.9
USSR		4.1	8.3	11.5

Source: Maddison (1989), Table 6.8; weighted for shares of primary, secondary and tertiary education

However, both the measures of enrolment and attainment largely overlook the significant improvement in the quality of education. The third human capital measure, which has gained more popularity in recent decades, due to increased data availability, therefore focuses on *direct measures of educational achievement,* such as surveys of literacy or mathematical skills. Recently these efforts have been combined in the OECD Program for International Student Assessment (PISA), which covers OECD countries as well as an increasing number of non-OECD countries.[20] Despite the virtues of these direct measures of educational quality, there are still important issues concerning survey and test limitations and international comparability of the measures (OECD, 2001). Moreover none of these measures deals with the skills and competencies that are gained after completing formal education, although some measures are included in the Adult Literacy and Life Skills (ALL) survey, including attitudes to teamwork, problem-solving, practical cognition skills and the working with information technology (OECD, Statistics Canada and U.S. National Center for Education Statistics).

[20] See http://www.pisa.oecd.org/

The fourth measure of human capital avoids the issue of quality differences in educational attainment altogether by focusing directly on the market value of human capital which is measured as the *earnings at different levels of educational attainment.* This approach assumes that earnings differentials reflect differences in the returns to human capital creation, which may become problematic in particular when comparing countries with very different institutional arrangements in their labour markets (see Chapter 3). The major advantage of the latter measure, however, is that it can be relatively easily used in measuring the impact of education on output and productivity growth.

Given the fact that human capital is widely accepted as an important means to strengthen the growth potential, there has been a huge research effort to measure the effects of education on growth. Again various approaches can be distinguished.[21] Firstly, with the availability of earnings measures, a substantial body of research has focused on *measuring the private and social returns* to education. Such measures reflect the private benefits relative to either the private or total cost of education, with the latter including both private and public expenditure on education. Table 2.14 shows measures of private and social benefits for a recent year (mostly in the 1970s or 1980s) for 42 countries (Psacharopoulos and Patrinos 2002). These measures confirm earlier evidence that (1) private returns to education exceed social returns (partly because the latter does not capture the social benefits of education); (2) returns on primary education exceed those on secondary and higher education; and (3) that returns are highest in lower and middle income countries.

According to Temple (2001) one major problem concerning the measurement of returns to investment in education concerns the causal interpretation. Higher returns may be caused by differences in education, but they may also drive the decision on whether or not to take education in the first place. These issues are partly tackled in *growth regression analysis* which provides a way of testing the relationship between, on the one hand, years of schooling and, on the other hand, per capita income and productivity by using time lags on the variables in question. The evidence suggests a positive impact of education on growth but the size of the effect that is usually found is not very large. For example, Bassanini and Scarpetta (2001) show that for a sample of 21 OECD countries an extra year of average schooling raises output per capita by 6 per cent. The effect may be somewhat larger for lower income countries, but there is also substantial more variation across low income countries (Benhabib and Spiegel 1994). Other factors, related to social capabilities, interact with the effect of education on growth. Moreover in particular with large samples of countries most studies have relied on the somewhat imperfect measure of enrolment in schooling as a measure of human capital.

The final approach to measure the relationship between human capital and growth is through applying a growth accounting framework. This approach is embedded in a production function framework relating human capital and physical capital to output, using their marginal products as weights to measure their impact on growth. The residual of the growth accounting function reflects the rise in efficiency (called total factor productivity) beyond the accumulation of physical and human capital inputs. Despite some serious limitations of the growth accounting approach, in particular the inability to test for complementarity of factor inputs and other social and technological capabilities, it is particularly useful in case very detailed measures of labour input and earnings differentials by skill

[21] See Temple (2001) for an extensive review of these approaches.

Table 2.14: Returns to Investment in Education by Level (latest year)

	Private Returns			Social Returns		
	Primary	Secondary	Higher	Primary	Secondary	Higher
OECD	13.4	11.3	11.6	8.5	9.4	8.5
Non-OECD Europe, Middle East and N-Africa	13.8	13.6	18.8	15.6	9.7	9.9
Asia (non-OECD)	20.0	15.8	18.2	16.2	11.1	11.0
Latin America & Caribbean	26.6	17.0	19.5	17.4	12.9	12.3
Sub-Saharan Africa	27.6	24.6	27.8	25.4	18.4	11.3
World	26.6	17.0	19.0	18.9	13.1	10.8

Source: Psacharopoulos and Patrinos (2002), Table 1

category can be obtained. An additional step can be made to extend the growth accounts with a set of accounts that treat the education sector more explicitly. For example, Jorgenson and Fraumeni (1992) calculate a measure of education output, with human capital being defined as the discounted stream of lifetime income of each person, given age, sex and level of educational attainment. Unfortunately the evidence from growth accounting studies concerning the effect of education on growth is limited in particular for developing countries, and the effects of education on growth that are found do not go much beyond to what the marginal product suggests, hence generating limited additional productivity growth.

One issue that continuously interferes with analysing the impact of human capital on growth is the difficulty to measure possible spillover (that is, productivity) effects from education. Szirmai (1997) mentions five objectives of investments in education: (1) the promotion of growth and development; (2) the modernisation of social attitudes and mentalities; (3) political socialisation, increasing civic responsibility, national integration and consciousness; (4) reducing social inequality and increasing social mobility; and (5) contributing to personal development and freedom through emancipation. Although only the first objective directly considers economic development, the other four can contribute indirectly to improvements of the human capital stock and institutional change. Education feeds the social capabilities that are required for the realisation of the economic potential.

The main conclusion to be derived from this discussion is that despite the world-wide improvements in the quality of education and health, the direct measured effects on economic growth are limited. Indeed whereas measures of education and health have converged between developing and advanced countries, and human capital creation has positively impacted growth about everywhere, it has not stopped the process of divergence in productivity and per capita income over the past two centuries. Clearly the creation of human capital is insufficient on itself to generate economic growth.

To understand how the virtuous circle of creating more productive jobs through human capital creation can be started and sustained, further attention is required for the interaction between the creation of human capital and other factors impacting social and technological capabilities. For example, on the one hand engineers and natural scientists who play an important direct role in research and development activities. The economic returns on knowledge and skills enhanced by

education is largely sector and technology specific. On the other hand, the development of such specific skills also requires an amount of general knowledge. The optimal balance between general knowledge and creation of specific skills is very difficult to grasp. Goldin and Katz (1999) have analysed various types of technology-skill complementarities over the long run in the United States. They found that the factory system that came along with the industrial revolution and mass-production techniques required large amounts of unskilled and cheap labour. Meanwhile the skills used in the traditional handicraft and manufacturing were disappearing rapidly because they became obsolete. More recently, however, technological change has become more and more skill biased (Berman et al. 1994; Acemoglu 2002).

2.5 Conclusion

This aim of this chapter has been to keep the reader primarily focused on the long run trends in productivity and employment related factors. The long term focus will help to understand what determines the potential for productivity growth, how this potential is realised and how it is related with the creation of decent jobs.[22] It also avoids pitfalls which may arise when taking the short run issues as the point of departure. An exclusive focus on remedies that solve short run problem can lead to policy mistakes that negatively impact the ability to achieve the long run objective, namely a higher living standards for a larger share of the world population.

This review of the long term development of the relationship between employment creation and economic performance shows that the rise in income and productivity over the past two centuries has gone together with large shifts in the composition of labour both in terms of quantity and quality. Although the evidence generally points in the direction of the creation of more productive and high quality jobs in the world economy, there are large and increasing differences in growth performance across countries. The analytical framework introduced in this chapter stresses the importance of social capabilities to exploit the growth potential, and the need for a balanced institutional framework to realised the potential.

To understand the conditions under which this potential is not created or realised, the focus needs to be shifted to the medium run, during which many of the relevant institutions that support or frustate the virtuous circle of productivity, employment and povery alleviation are shaped. This will be the focus of Chapter 3. However, the lesson to be learned from the present chapter is that medium term considerations and policy measures associated with it should be seen in the light of the evidence from this chapter on the long run relationship between high productivity growth and the creation of high quality jobs.

[22] Although there is continued discussion abou the precise definition of decent jobs, the following characteristics have been attributed to it: it provides productive and secure work; it ensures respect of labour rights; it provides an adequate income; it offers social protection; it includes social dialogue, union freedom, collective bargaining and participation (see http://www.ilo.org/public/english/region/ampro/cinterfor/publ/sala/dec_work/ii.htm)

3. Conditions for an Employment-Productivity Trade-off

3.1 Introduction

In chapter two we focused on the long run trends of income, productivity, population and employment. We exemplified how in the long run productivity and employment growth are positively related. However, we also showed that the dynamics of growth have gone together with large shifts in the composition of labour both in terms of quantity and quality. These changes have important repercussions for the relation between productivity and employment growth at particular points in time, for particular countries, specific sectors of the economy, and certain groups of workers in the society. This chapter is centered around the question when and under which conditions the positive relationship between productivity and employment turns into a trade-off. These conditions are becoming most visible in a medium run perspective.

In Section 3.2 we outline four ways to look empirically at the trade-off between productivity and employment. The first way is to simply focus on the frequency at which productivity and employment growth rates are negatively related. Secondly, we focus on how often an *acceleration* in productivity growth goes together with a *deceleration* in employment growth. Thirdly we look at the trade-off between productivity growth versus a decline in labour intensity. The fourth version of the trade-off relates productivity growth to a slowdown in the quality of employment.

The chapter then continues by discussing the trade-off in the light of two approaches in the literature. We first refer to the theory of equilibrium unemployment (Section 3.3). This literature suggests that in the medium run – with a given state of technological and social capabilities – the relation between productivity and employment growth depends on the institutional environment which determines the flexibility of labour market arrangement.[23] In particular labour market rigidities and product market regulations play a key role in this framework. Secondly, we focus on the debate concerning the changes in capital-labour ratios and their impact on labour productivity. It is shows that changes in the relative prices of capital and labour are driven by underlying changes in the composition of capital (in particular the increasing share of ICT capital) and labour (in particular higher skills) and related technological change which has been referred as skill-biased.
Finally, Section 3.4 looks in more detail at the role of income distribution in relation to the productivity and employment growth. Although it is well known that personal income distribution is an important endogenous cause behind accumulation of human capital, there is virtually no literature on the relationship between personal income inequality and economic growth. We discuss how productivity and employment growth may be related to changes in the relative shares of capital and labour in national income, i.e. the functional distribution of income. The latter is the result of changes in factor prices, elasticities and technological change. Although some clearly distinct patterns can be discerned when comparing countries in Asia and Latin America, more research will be needed to understand the dynamics of these patterns in the light of differences in structural and institutional change in these countries.

[23] See also Landmann (2002) for a more extensive overview.

3.2. The Trade-off between Productivity and Employment

Essentially there are four ways to approach the trade-off between productivity and employment:

1) The first and simplest approach is to see whether productivity and employment growth are negatively related. In particular we are interested in cases where productivity rises at the expense of employment reductions. This may also be referred to as "jobless growth". Although productivity growth and employment growth tend to be weakly negatively related, a rise in productivity only coincides with a decline in employment in a very limited numbers of cases. This is most notably so in situations where extraordinary structural reforms take place correcting for major malfunctionings of the economic model, such as in the former socialist economies of Central and Eastern Europe during the 1990s.
2) The second somewhat more subtle version of the trade-off is where the acceleration (or deceleration) of productivity growth goes together with a slowdown (or acceleration) in employment growth. There are many cases where this type of trade-off occurs, changing the fortunes of countries to jump on the virtuous circle of productivity and employment growth.
3) Thirdly, the trade-off can be interpreted as a case where the growth in productivity goes together with a decline in labour intensity, i.e. a fall in working hours per person employed and/or a decline in the employment to population ratio. This implies that per capita income, as a proxy for living standards and poverty alleviation, increases more slowly than productivity.
4) The fourth version of the trade-off is related to the quality of employment. If productivity growth primarily implies more jobs but of lower quality, in terms of lower real wages, a quality trade-off with potential impact on slower income growth may be the result.

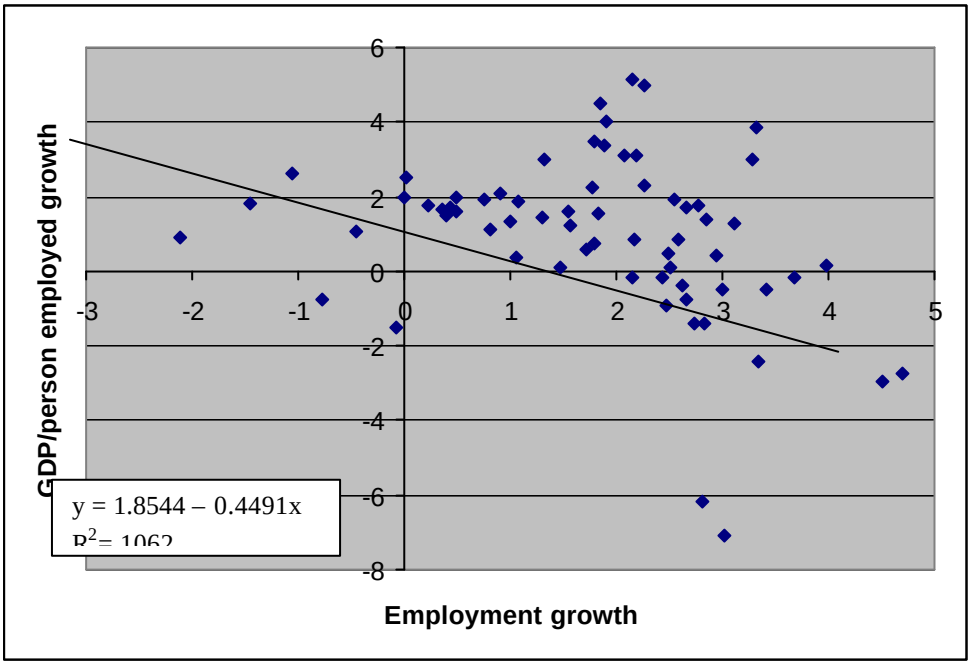
Productivity and employment growth

Figure 3.1 provides an assessment of the long run interaction between employment and productivity growth for a cross-section of 66 countries, in which all parts of the world are included, from 1980 to 2000. Although a weak negative relationship between productivity and employment growth can be distinguished, the world wide picture looks very diverse. More than two-thirds of the countries are in the northeast quadrant of the diagram, exhibiting both productivity and employment growth. Within this quadrant there is no positive or negative relationship.

A closer analysis of the other quadrants suggests a distinctive concentration of certain "country clubs". The four countries in the northwest quadrant (Bulgaria, Czechoslovakia, Poland and Hungary) and the two countries in the southwest quadrant (Romania and the former Soviet Union) are all transition economies, which experienced a rapid decline in employment during the 1990s. Following the fall of the Berlin Wall in late 1989, the imminent crisis that had built up from a faltering economy during the communist period called for rapid structural reforms. These reforms followed upon a crisis that fully emerged after the planning system collapsed. When borders opened up and markets liberalized, the lack of competitiveness of these economies became revealed. While many firms collapsed, only the most productive businesses survived. Many people lost their jobs, and on the whole growth rates of output and productivity turned negative or at best remained modestly positive. Hence the loss of jobs during the previous decade was not the result of productivity growth. On the contrary, it was the result of stagnating productivity levels during the communist era. Yet this process

of rationalisation appeared necessary to generate positive economic dynamics and renewed job creation.

Figure 3.1: Relation between Growth Rates of Employed Persons and Labour Productivity, 1980-2000



Note: Employment growth measured as growth in number of persons employed
Source: Groningen Growth and Development Centre (http://www.ggdc.net/dseries/totecon.shtml) and ILO (2003), KILM 18

In the southeast quadrant a fair amount of countries can be found with positive or even very high growth rates of employment but negative productivity growth. These countries are mainly located in Africa, Latin America (Brazil, Venezuela and Peru) and the Middle East. High employment growth in these countries is primarily explained by high population growth but with slow growth in output and income per capita. Yet, some resource rich economies like South Africa and Venezuela are also characterised by economic stagnation. These countries failed to create enough productive jobs to raise average income levels, in spite of their resource abundance.

Productivity and employment acceleration

A more subtle version of the productivity-employment trade-off is to look at whether an acceleration in productivity growth is related to a deceleration in employment growth. Table 3.1 compares the acceleration and deceleration of productivity and labour input growth by major region in 1973-1990 over 1960-1973, and in 1990-2000 over 1973-1990.

A negative relation between the change in productivity and labour input growth rates is clearly confirmed. For the world economy as a whole, growth in output per hour strongly decelerated after 1973 whereas labour input growth slightly accelerated. This relationship was found across regions, with the exception of Asia, where China accelerated productivity growth without reducing labour

input growth, and India realised moderate productivity growth with a substantial rise in labour input growth rates. From 1990-2000 the cards turned, as a moderate worldwide acceleration in productivity growth was offset by a substantial slowdown in labour input growth. However, the slowdown did not always occur in regions with accelerated productivity growth. For example, Japan, the transition economies, East Asia and Africa showed a slowdown in both productivity and employment growth. In China, South Asia, Latin America and the Middle East, faster productivity growth was achieved at the cost of a slowdown in labour input growth.

Table 3.1: Relationship between Acceleration/Deceleration in Labour Productivity and Employment Growth, 1960-1973, 1973-1990, 1990-2000

	GDP per hour worked		Total hours worked	
	1973-1990 over 1960-1973	1990-2000 over 1973-1990	1973-1990 over 1960-1973	1990-2000 over 1973-1990
Major Europe (a)	-2.5	-0.5	0.2	0.3
Major non-Europe, of which (b)	-2.0	0.1	-0.1	-0.5
Japan	-5.2	-0.8	-0.3	-1.5
United States	-1.3	0.3	0.0	0.0
Transition Economies	-1.1	-1.9	-1.9	-1.5
CEE countries (c)	-2.6	2.1	-0.6	-1.7
former USSR	-0.3	-6.0	-2.5	-0.3
Asia (d)	0.8	1.4	0.5	-1.0
East Asia	-0.9	-0.1	-1.4	-1.3
South East Asia	-0.9	0.4	0.8	-1.5
China	2.3	2.3	0.0	-1.0
South Asia	0.2	1.3	1.2	-0.9
Latin America	-2.8	0.7	0.1	-0.5
Africa	-2.3	-0.5	0.3	-0.1
Middle East	-7.1	1.4	0.9	-0.4
	0.0	0.0	0.0	0.0
World	-2.0	0.7	0.3	-0.7

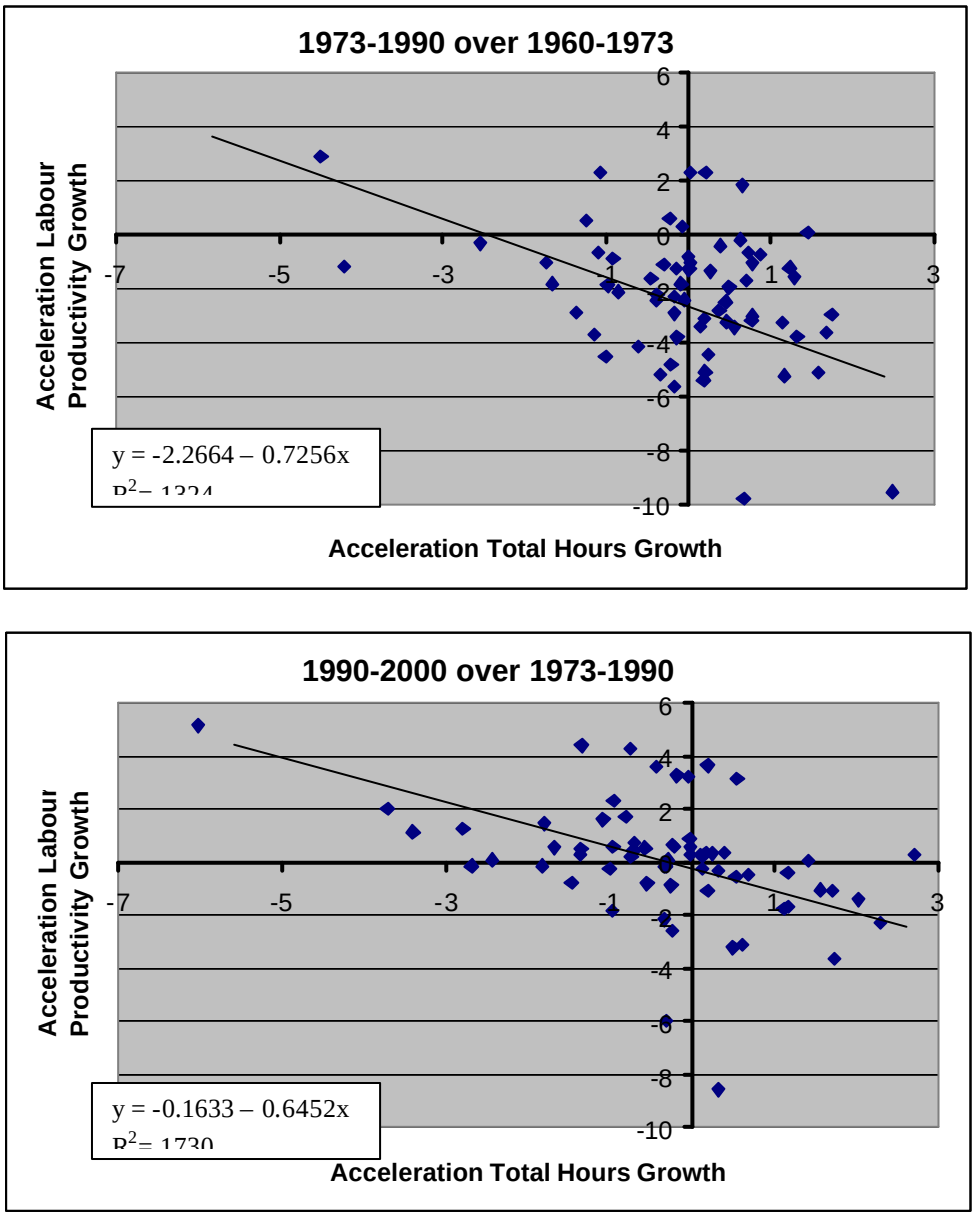
(a) excluding transition economies, including Turkey; (b) Australia, Canada, New Zealand, Japan and United States; (c) Central and Eastern European countries, excluding former USSR; (d) excluding Japan

Source: Groningen Growth and Development Centre (http://www.ggdc.net/dseries/totecon.shtml) and ILO (2003), KILM 18.

The relative positions of Europe and the U.S. concerning the trade-off between productivity and labour input growth has been the subject of substantial debate in the literature as well as among policy makers. Up to the mid 1990s, labour productivity growth in the European Union was substantially higher than in the United States but with a much less impressive labour input performance. In fact labour input growth in Europe was negative up to the 1990s, whereas it increased on average at 1.6

per cent per year in the United States. This EU-US differential may be referred to as the Atlantic Divide (Siebert 1997; Nickell 1997). The situation in Europe improved somewhat during the 1990s as labour input growth accelerated but at the cost of a substantial slowdown in labour productivity growth. In contrast, in the U.S. productivity growth accelerated during the 1990s without a slowdown in employment growth.

Figure 3.2: Relation between Acceleration of Labour Input Growth and Labour Productivity Growth, 1973-1990 over 1960-1973 and 1990-2000 over 1973-1990



However, the comparison of the change in productivity labour input growth may still not tackle the trade-off issue in an adequate way.[24] Firstly, in addition to the U.S., there have been many other

[24] One issue, not dealt with here, is that a comparison of labour productivity growth and changes in *unemployment* will easily do away with the trade-off hypothesis on the Atlantic Divide. Whereas productivity

countries which have succeeded to accelerate both productivity and labour input during sub-periods. Figure 3.2 shows the frequency of the trade-off for the sample of 66 countries in our database. Countries in the northwest and the southeast quadrant concern a trade-off. Although the relation between the change in productivity growth and labour input growth is significantly negative, it is strongly dominated by a small number of outliers (including such countries as United Arab Emirates, Iran and Saudi Arabia).

Change in trade-offs between change in productivity growth and labour input growth, number of countries

	Productivity growth acceleration	Productivity growth deceleration
1973-1990 over 1960-73		
Labour input growth acceleration	4	***31***
Labour input growth deceleration	***5***	26
1990-2000 over 1973-1990		
Labour input growth acceleration	9	***16***
Labour input growth deceleration	***28***	13

Trade-offs are in ***bold & italics***

The overview above shows that although the number of countries that have shown an acceleration in productivity growth significantly increased when comparing the last two periods (1990-2000 over 1973-1990) with the first two periods (1973-1990 over 1960-1973), the number of cases showing a deceleration in labour input growth has also increased. Still the number of countries which showed both an acceleration in productivity and labour input growth (including Myanmar, Argentina, Denmark, Venezuela, Ivory Coast, Ireland, Malaysia, Israel and the United Kingdom) has increased whereas the number of countries which experienced a decline in both productivity and labour input growth halved.

A second reason for not deriving too strong conclusions from this analysis, is because one not only needs to look at the rise in labour input, but also at changes in labour intensity, i.e. the share of employed labour relative to potential labour. In the next subsection we focus on the relationship between labour productivity and labour intensity.

---

growth slowed down, and labour input growth slightly accelerated, unemployment rates in many European countries – notably in Germany - have continued to go up (Landmann, 2002, Figure 2). This suggests that despite a rise in labour hours, the potential for increasing labour input in Europe has remained unrealised to a large extent.

Productivity growth and labour intensity

As the extent to which productivity growth can contribute to poverty alleviation is a key area of interest for this report, we are also interested in how productivity and labour intensity interact, as both together determine the development of per capita income. The relationship can be simple laid out as follows. The growth in income per head of the population (ΔO/P) is a function of the change in labour productivity (ΔO/H) and labour intensity, expressed as the number of working hours per head on the population (ΔH/P):

$$\Delta O/P = \Delta O/H * \Delta H/P \quad (1)$$

Then, the change in working hours per person is decomposed into the change in hours worked per person employed *(H/E)* and the change in the share of employment in the total population ***(E/P)*:**

$$\Delta H/P = \Delta H/E * \Delta E/P \quad (2)$$

The change in the employment/population ratio *(E/P)* can be further broken down into the number of persons employed relative to the total labour force (i.e., employed persons plus registered unemployed persons) *(E/L)*, the ratio of the labour force to all persons aged 15 to 64 (i.e., the working age population) (*L*/*P*1564) and the share of the working age population in the total population *(P*1564/*P)* (see van Ark and McGuckin 1999):

$$\Delta E/P = \Delta E/L * \Delta L/P1564 * \Delta P1564/P \quad (3)$$

In Table 3.2 we provide the breakdown as above for the periods (1960-73, 1973-90 and 1990-2000). As for many developing countries the formal unemployment rate has little meaning because of the incidence of underemployment we only look at the employment share in the working age population (Δ*E*/*P1564*).

The Table shows some important differences across regions. In Europe the rise in productivity growth has not been fully translated in growth in GDP per capita. Between 1973 and 1990 productivity growth in Europe increased 0.6 percentage point faster than per capita income. This is in particular due to a continuous slowdown in working hours per person employed. In addition a slowdown in employment/population ratios (in particular in Northwest European countries) has further contributed to the gap between productivity and income growth rates in Europe.

In Japan the gap between productivity and income growth rates became particularly large since 1990. But before 1990 growth rates in Japan were much faster than in Europe, and on balance labour intensity increased so that income growth was somewhat faster than productivity growth. The latter is also true for the United States, mainly because of continuous increases in the employment-working age population share. Hence the different trade-offs between work and leisure (or involuntary inactivity) within the OECD group of countries again emerge from this Table. In the transition economies the trade-off between productivity and labour intensity has been particularly strong during the 1990s.

East and Southeast Asia represent the clearest case of rapid productivity growth that avoided the trade-off with declining working hours and participation rates. In addition to productivity growth rates which were roughly double that of the Western world since 1960, increased participation has added up to 1.5 per cent per year to the growth rates of per capita income, although the effect diminished somewhat during the 1990s. In Southeast Asia labour force participation growth turned negative during the 1990s, in particular because of the strong decline in employment since the Asian crisis.

When looking at the other developing regions, the effects of increased labour force participation on GDP per capita are much smaller or zero, showing that the demographic transition has not materialized into a demographic gift.[25] The share of the working age population to the total population has turned strongly positive in most developing countries during the 1990s, notably in Latin America, Africa and the Middle East. Instead of viewing this as a positive contribution to per capita income growth, we should stress here the dismal productivity performance. Indeed productivity growth in these regions could have been much higher, had the rise in the working age population been turned into a demographic gift as in East Asia.

The estimates of trade-off between productivity growth and changes in labour intensity can also be viewed from a comparative perspective by focusing on relative levels. In Table 3.3 we present labour productivity and per capita income as a percentage of the U.S. level. The labour market indicators represent the labour intensity relative to the U.S., contributing positively or negatively to the per capita income gap. The estimates show that in Europe, lower working hours and lower rates of employment to working age population together account for 22 percentage points of the difference between the productivity and per capita income gap relative to the United States. In other OECD countries (Australia, Canada and New Zealand) this largely arises from lower labour force participation only. In East and South East Asia, per capita income gaps relative to the U.S. are mostly smaller than productivity gaps, whereas the opposite is the case for South Asia and in particular for Latin America.

[25] It should be stressed that the zero-effects on hours worked are due to assumption that in many developing countries we assumed average working hours per person to remain unchanged.

Table 3.2: Decomposition of labour productivity growth into effects of working hours, labour force participation and GDP per capita, 1960-2000

Country or area	GDP per hour worked	Effect of working hours[1]	GDP per person employed[2]	Effect of employment as a percent of working age population (aged 15 to 64)[3]	Effect of active population (aged 15 to 64) as a percent of total population[4]	GDP per capita[5]
Major Europe (a)						
1960-73	5.0	-0.8	4.2	-0.2	-0.2	3.8
1973-90	2.5	-0.7	1.8	0.1	-0.1	1.9
1990-00	2.0	-0.3	1.7	-0.1	0.1	1.7
Japan						
1960-73	8.0	-0.2	7.8	-0.2	0.4	8.1
1973-90	2.8	-0.3	2.6	0.2	0.2	2.9
1990-00	2.0	-0.9	1.1	0.2	-0.2	1.1
United States						
1960-73	2.6	-0.3	2.2	0.2	0.5	3.0
1973-90	1.3	-0.2	1.1	0.7	0.1	1.9
1990-00	1.5	0.3	1.9	0.3	0.0	2.1
Other Major Non-Europe (b)						
1960-73	3.4	-0.5	3.0	-0.7	0.6	2.9
1973-90	1.7	-0.3	1.4	-0.2	0.3	1.5
1990-00	1.8	0.0	1.8	-0.2	0.0	1.6
Transition Economies						
1960-73	2.6	-0.3	2.3	0.7	0.4	3.4
1973-90	1.5	-0.2	1.3	-0.5	-0.1	0.7
1990-00	-0.3	0.0	-0.3	-1.9	0.4	-1.8
East Asia						
1960-73	5.5	0.3	5.8	0.9	0.6	7.3
1973-90	4.7	-0.1	4.5	0.5	0.9	5.9
1990-00	4.5	-0.2	4.3	0.2	0.4	4.9
SE Asia						
1960-73	3.2	0.0	3.2	0.0	0.0	3.2
1973-90	2.2	0.0	2.2	0.4	0.6	3.2
1990-00	2.6	0.0	2.7	-0.7	0.6	2.6
China						
1960-73	1.3	0.0	1.3	0.4	0.0	1.7
1973-90	3.6	0.0	3.6	0.0	1.0	4.7
1990-00	5.9	0.0	5.9	0.3	0.2	6.5

Table 3.2: continued

	GDP per hour worked	Effect of working hours[1]	GDP per person employed[2]	Effect of employment as a percent of working age population (aged 15 to 64)[3]	Effect of active population (aged 15 to 64) as a percent of total population[4]	GDP per capita[5]
South Asia						
1960-73	1.8	0.0	1.8	-0.7	-0.1	1.1
1973-90	2.0	0.0	2.0	0.2	0.3	2.5
1990-00	3.3	-0.1	3.2	-0.2	0.3	3.3
Latin America						
1960-73	3.3	-0.2	3.0	-0.3	0.1	2.8
1973-90	0.4	-0.4	0.0	0.1	0.5	0.7
1990-00	1.1	0.0	1.1	-0.3	0.6	1.5
Africa						
1960-73	2.6	0.0	2.6	0.0	-0.2	2.5
1973-90	0.3	0.0	0.3	-0.2	0.1	0.2
1990-00	-0.1	0.0	-0.1	-0.3	0.5	0.0
Middle East						
1960-73	6.4	0.0	6.4	-0.4	-0.1	5.9
1973-90	-0.7	0.0	-0.7	-0.2	0.1	-0.9
1990-00	0.7	0.0	0.7	-0.2	1.0	1.6
World						
1960-73	3.2	-0.1	3.0	0.0	0.0	3.1
1973-90	1.2	-0.1	1.1	0.1	0.4	1.6
1990-00	1.9	0.0	1.9	-0.2	0.3	2.0

1 Calculated on the basis of actual hours worked per person per year.

2 Sum of columns 1 and 2.

3 Calculated on the basis of the ratio of employment to population 15-64

4 Calculated on the basis of employment force as a percent of the population aged 15 to 64.

5 Sum of columns 3, 4 and 5.

(a): Western and Southern Europe, including Turkey

(b): Australia, Canada and New Zealand

Source: Groningen Growth and Development Centre (http://www.ggdc.net/dseries/totecon.shtml) and ILO (2003), KILM 18

Table 3.3: Decomposition of labour productivity level (U.S. = 100.0) into effects of working hours, labour force participation and GDP per capita, 1960-2000

	GDP per hour worked as % of the U.S.	Effect of working hours[1]	GDP per person employed as a percent of of the U.S.[2]	Effect of employment as a percent of working age population (aged 15 to 64)[3]	Effect of active population (aged 15 to 64) as a percent of total population[4]	GDP per capita as percent of of the U.S.[5]
Major Europe (a)						
1960	46.2	3.0	49.2	1.7	6.5	57.3
1973	63.6	0.1	63.7	-1.5	1.6	63.9
1990	78.4	-6.1	72.3	-8.8	-0.6	63.0
2000	82.1	-11.2	70.9	-10.9	0.0	60.0
Japan						
1960	26.6	1.7	28.4	4.6	2.3	35.2
1973	54.2	4.6	58.8	6.3	3.4	68.5
1990	70.7	5.3	76.0	0.7	4.2	80.9
2000	74.3	-3.9	70.4	0.3	2.4	73.1
United States						
1960	100.0	0.0	100.0	0.0	0.0	100.0
1973	100.0	0.0	100.0	0.0	0.0	100.0
1990	100.0	0.0	100.0	0.0	0.0	100.0
2000	100.0	0.0	100.0	0.0	0.0	100.0
Other Major Non-Europe (b)						
1960	51.0	1.6	52.6	4.6	-0.2	57.0
1973	57.1	1.0	58.0	-1.7	0.1	56.4
1990	60.9	0.2	61.1	-10.2	1.1	52.0
2000	62.8	-2.1	60.7	-12.7	1.4	49.4
Transition Economies						
1960	23.6	2.1	25.7	4.7	1.9	32.2
1973	23.6	2.3	25.9	6.9	1.4	34.1
1990	24.6	2.3	26.9	0.7	0.2	27.8
2000	20.4	1.3	21.7	-3.8	0.9	18.7
East Asia						
1960	13.6	3.2	16.8	-3.1	-1.2	12.5
1973	20.0	6.7	26.7	-3.0	-1.8	21.8
1990	35.6	12.4	48.0	-7.2	2.1	43.0
2000	48.0	13.4	61.4	-9.9	4.8	56.4
SE Asia						
1960	9.2	1.1	10.3	0.7	-1.0	10.0
1973	9.9	1.7	11.6	0.5	-1.8	10.3
1990	11.7	2.5	14.1	-0.1	-1.3	12.8
2000	13.0	2.3	15.3	-1.5	-0.5	13.4

Table 3.3: continued

	GDP per hour worked as % of the U.S.	Effect of working hours[1]	GDP per person employed as a percent of of the U.S.[2]	Effect of employment as a percent of working age population (aged 15 to 64)[3]	Effect of active population (aged 15 to 64) as a percent of total population[4]	GDP per capita as percent of of the U.S.[5]
China						
1960	5.0	0.6	5.6	0.7	-0.4	5.9
1973	4.3	0.7	5.0	0.8	-0.7	5.0
1990	6.3	1.3	7.7	0.3	0.1	8.0
2000	9.8	1.7	11.5	0.4	0.4	12.3
South Asia						
1960	5.9	0.7	6.5	0.2	-0.4	6.4
1973	5.3	0.9	6.2	-0.5	-0.8	5.0
1990	6.1	1.3	7.3	-1.1	-0.7	5.5
2000	7.2	1.1	8.4	-1.7	-0.6	6.1
Latin America						
1960	32.5	2.7	35.2	-2.1	-3.4	29.7
1973	35.6	3.5	39.1	-4.7	-5.2	29.2
1990	30.9	1.9	32.7	-6.7	-2.5	23.5
2000	29.7	0.6	30.3	-7.5	-0.9	21.9
Africa						
1960	6.9	0.8	7.8	2.2	-1.1	8.9
1973	7.0	1.2	8.2	2.1	-2.0	8.3
1990	6.0	1.2	7.2	0.6	-1.6	6.2
2000	5.0	0.9	5.9	0.1	-1.0	5.0
Middle East						
1960	23.2	2.8	26.0	-0.6	-3.3	22.0
1973	38.2	6.5	44.7	-4.2	-8.2	32.4
1990	27.3	5.7	33.0	-7.6	-5.4	20.0
2000	25.2	4.3	29.5	-7.9	-2.7	18.8

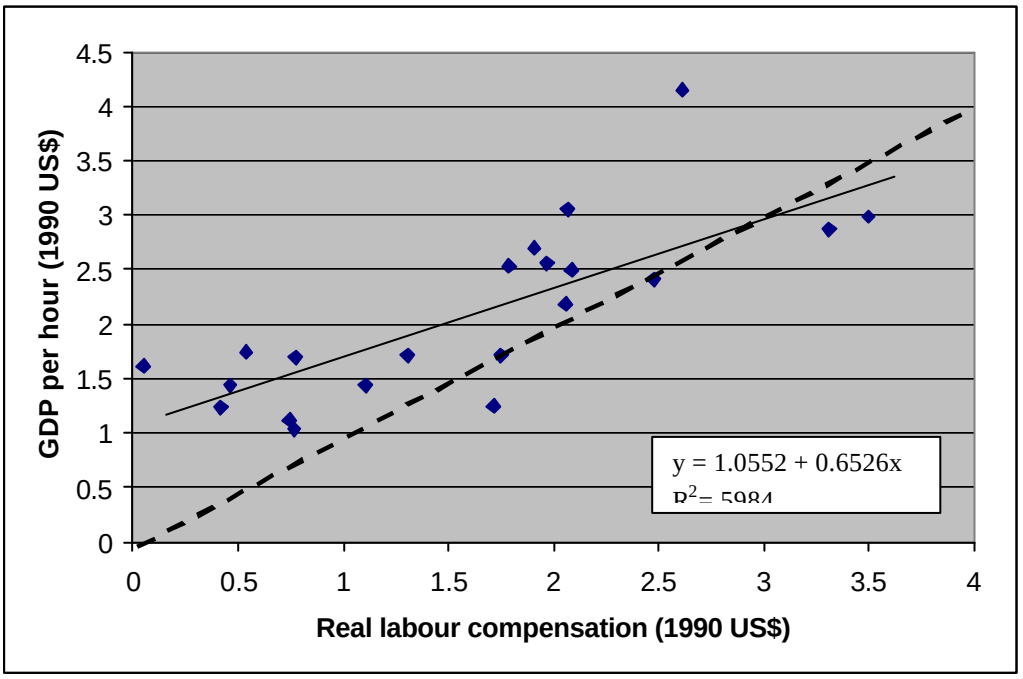
1 Calculated on the basis of actual hours worked per person per year.
2 Sum of columns 1 and 2.
3 Calculated on the basis of the ratio of employment to population 15-64
4 Calculated on the basis of employment force as a percent of the population aged 15 to 64.
5 Sum of columns 3, 4 and 5.
(a): Western and Southern Europe, including Turkey
(b): Australia, Canada and New Zealand
Source: Groningen Growth and Development Centre (http://www.ggdc.net/dseries/totecon.shtml) and and ILO (2003), KILM 18

Productivity growth and better jobs

Our final concern about the trade-off between productivity and employment is to the quality of employment rather than the pure quantity in terms of total hours worked. Productivity growth might be related to the creation of more jobs, but if these jobs are of lower quality, for example in terms of lower skill levels, a quality trade-off with potential impact on slower income growth may be the result.

Labour quality can be measured in various ways. In Chapter 2 we focused on the measurement of labour skills in terms of literacy and educational attainment of the labour force. We concluded that the quality of jobs has substantially increased over the years, although the direct impact on productivity is hard to show. Another direct measure of labour quality, which also underlies the growth accounting methodology outlined in Section 2.4, concerns the payment to labour. The assumption is that the rise in real wages may be related to productivity growth, which in turn reflects a larger share of high-skilled people in the labour force.

Figure 3.3: Relation between Labour Productivity Growth and Growth in Real Labour Compensation, 1985-2000



Note: real labour compensation is measured as total compensation of labour, adjusted for imputed income of self-employed (assume wages of employees) and deflated at the private consumption deflator.

Source: Groningen Growth and Development Centre (http://www.ggdc.net/dseries/totecon.shtml) and ILO (2003), KILM 18.

Private consumption deflator from OECD, Economic Outlook.

Unfortunately, comprehensive measures of real wages (covering the total economy, all occupations and including all components of labour compensation) can only be obtained for a limited number of countries, mostly for OECD countries. Figure 3.3 shows the relationship between the growth in labour

productivity (GDP per hour) and real labour compensation (total compensation deflated at the private consumption deflator) per hour from 1985-2000.[26] The chart shows a positive relationship between both measures, suggesting that productivity growth and real labour compensation move together in parallel. Figure 3.3. also shows that most observations are above the 45°-degree line. Hence in most countries labour productivity growth has increased faster than real wages since 1985. Only in Belgium, Portugal, Sweden, Switzerland and Turkey, real labour compensation grew faster. This implies that the rise in labour productivity during the 1990s has gone together with a higher rise in real capital compensation. We will return to this issue in Section 3.4.

3.3 Labour Market Rigidities and Skill-Biased Technological Change

The labour market literature on the theory of equilibrium unemployment suggests that the relation between productivity and employment growth can be either positive or negative depending on the time frame considered. In the short run, labour market disequilibria are related to the business cycle and arise as the demand for labour tends to be strongly inelastic. The elasticity in the medium run depends to a large extent on the institutional environment determining the exchange of labour effort. In the long run technological change determines the demand and supply of labour.

In this section we will discuss two features of labour market rigidities that influence the trade-off between productivity and employment growth in the medium run. Firstly we discuss labour market equilibria under the assumption of structural unemployment and underemployment due to government intervention and positive costs of renegotiating labour contracts. Secondly we focus on the long run impact of technological change on capital, labour and skill ratios and their respective prices, in particular with respect to the complementarity of information and communication technology and skills.

Labour supply and demand and equilibrium unemployment[27]

Theoretically, explanations for structural unemployment can be separated into a supply-side and a demand-side part. On the supply side this boils to the principle that the (free) market clearing wage rate is some alternative source of income (e.g. a social benefit), so that the unemployed are not induced to search for a job. Unfortunately most of the theory in this area has focused on advanced countries, where labour supply and demand (in terms of total working hours) are assumed to be roughly equal in the long run. In advanced countries state benefits for unemployed induce an undersupply of labour in the medium run when these benefits exceed the rate of return to labour. The more generous and accessible the state benefit is, the more likely it is that people will opt for leisure above work. The same effect can arise from relatively high levels of income tax and social security payments which lower the level of net to gross income, and therefore reduce the attractiveness of offering labour over leisure.

[26] The productivity measures and total labour compensation measures in nominal terms are derived from KILM 18, and are based on GGDC estimates.

[27] For a more extended treatment of issues dealt with in this section, see Landmann (2002).

It is easy to see how productivity growth can enhance the supply of labour in these circumstances. As the marginal productivity of labour improves, higher wages raise the supply of labour. Decreasing unemployment benefits will in principle have the same effect, although it may have an offsetting effect on labour productivity growth as the relative price of labour falls and production may become more labour intensive (Blundell and MaCurdy 1999).

On the demand side, insufficient labour demand may in theory be due to an institutionalized minimum wage rate which exceeds the marginal productivity of labour. In many industrialised countries minimum wages are set by state legislation. The minimum wage level results in a bottom line of the effective demand for labour by employers. Furthermore, company taxes and social security payments by the employers can raise labour costs and depress demand. This may also affect the supply side as the income gap between employees at the lower end of the market wage scale and the unemployed closes (Smith 2003).
In developing countries state interventions in the labour market are often much weaker than in advanced countries. Under free labour market conditions, unemployment more often results from an oversupply of labour and an equilibrium wage level that falls below subsistence level. Such a free labour market outcome leads to a large amount of persons who are underemployed rather than unemployed, because the choice of supplying no labour at all is no option. Basically underemployment is the result of demographic growth exceeding the capacity of the economy to expand through innovations and creation of social capabilities that create new employment opportunities. The direct result of the rapid natural growth of the labour supply has resulted in the formation of large urban informal economy in the developing world (see also Section 4.4).

The static disequilibria in the labour market described above are enforced by several inherent rigidities in the supply and demand for labour. In general relative prices of both skilled and unskilled labour adjust rather slowly to changes in labour supply and demand. Labour markets are often highly fragmented due to distinctive skill requirements and geographical and social bindings of workers.

These dynamic disequilibria also occur because renegotiating a labour contract takes time and creates uncertainty due to imperfect information which incur additional costs. The costs of hiring and firing for employers may be too high to respond quickly to changes in wage rates or product demand. Hence employers keep workers employed at wages that exceed their marginal productivity because the costs of firing are even higher and the rate of return to labour is expected to rise in the future. But this argument also goes the other way as it may withhold employers from hiring additional labour. Employees may also hesitate to renegotiate their labour contract when they fear the risk of losing a job creating uncertainty in their future financial and social perspectives. The extent of negotiating power of employers and employees highly depends on the relative power of labour unions and the outcome of the political market (Booth 1995).

In sum, most labour market rigidities result from institutional measures. These measures have often been introduced to protect labour against the risk of exploitation and sudden external shocks. However, they may also cause structural unemployment as labour demand falls short of its equilibrium level due to the relatively high labour costs incurred by legislation and taxation. The

amount of flexibility and rigidity in turn influences the response of employment to increases and decreases in productivity (Smith 2003).

Factor-biased technological change

Technological change supports productivity growth. In some cases technological change is neutral with respect to the demand of production factors, i.e. labour - skilled and unskilled -, capital and land. Many product innovations, for instance, are largely made possible through the opening up of new product markets and the creation of new sources of income, regardless of the relative amount of factor inputs needed in the production process. More often, however, technological change is considered to be factor biased (Hicks 1932; Autor, Krueger and Katz 1998; Acemoglu 2002).
Suppose an economy has one relatively abundant factor (labour) and one relatively scarce factor (capital). It can be conceived that there is an incentive to direct innovations towards the abundant factor, economizing on the more expensive scarce factor. If there is a clear bias in technological change, it tends to enhance path dependency in innovation, that can be either labour saving or labour augmenting. A typical example of such a path-dependent growth process is the capital-intensive path followed by the USA and the more labour and skill intensive path of the UK and continental Europe during the 19th and early 20th centuries (Broadberry 1997).

As a result of relative factor endowments and path dependent innovations, the response of employment to productivity increases can show large differences across economies. Biased or directed technological change can thus be induced by initial relative factor supplies. The elasticity of substitution of production factors also plays a role concerning the extent to which technological change is biased. Especially the supply of land and skilled labour can be quite inelastic even in the medium run, whereas the supply of capital and unskilled labour responds more easily.

A good example of induced technological change concerns the specific direction of agricultural technological development. For example, most New World countries (North America and Oceania) are typically characterised by high land-labour ratios. As a result agricultural innovations have been directed towards mechanization. The use of new machines increased the use of the abundant factor land and saved on the relatively scarce factor labour. In contrast, in Asian countries with a relatively low land-labour ratio, innovation efforts in agriculture have taken a path of applying labour intensive technologies, increasing yields per hectare of land. Clearly the focus of innovation was then on biological and chemical technologies centered around the introduction of new crop varieties that respond to fertilizers. Indeed employment growth in agriculture in Asia has been faster than in the New World. European countries have typically been positioned in the middle range of land- and labour-biased technological development in agriculure (Hayami and Ruttan 1985). It should be stressed, however, that in the long run these effects of directed technological change in agriculture are overshadowed by the structural change of the economy from agriculture to industry. As a result in almost all economies, productivity growth in agriculture is typically labour saving (van der Meer and Yamada 1989).

With respect to the oversupply of labour in many developing countries displayed by the large number of underemployed persons, it has often been suggested that the industrialisation process of developing countries has been too capital-intensive given their relative resource endowments. This tendency is

partly related to the process of structural change itself and the (mostly) parallel process of increased openness for imports of foreign technology (Fei and Ranis 1997). Under the conditions of a rapid release of labour from agriculture in combination with the overall demographic transition, labour-biased technological change would be the most optimal path of economic development for development countries. However, industrial technology has mostly been capital biased, partly because of the inherent role of machinery in industrialisation and because industrial technological development was largely based on the relative factor endowments of the traditionally industrialising countries. In an open economy environment, the relative prices of capital to labour have gone down. As a result increased global competition has forced economies to accumulate more capital and increase productivity. This relatively capital-intensive path of development has undoubtedly contributed to a trade-off between productivity and employment in developing countries.

Policies to support labour-biased technological change, substituting productivity increases for more employment creation, do not appear to be a viable alternative for developing countries in the long run. Indeed worldwide technological development is strongly biased towards capital, and the quality-price ratio of the same products produced with labour-intensive technologies would be lower across almost the entire technological spectrum of labour-capital ratios, with the exception of some informal (relative closed) parts of the economy (see Section 4.4). As the global environment acts as a constraint that cannot be lifted, economic choices will be made within this constraint (Todaro and Smith 2003). More importantly, a growth path based on relative capital-intensive technologies can eventually also create more opportunities for welfare and employment improvement, in particular when countries export their products at comparatively low prices.

Turning now to the most recent technology, namely information and communication technology (ICT), one can observe a large impact on the employment-productivity trade-off in the medium run. To fully understand the impact of ICT, the view of an homogenous labour market (where each labourer produces the same amount of output) needs to be dropped. As stated above, in reality the labour market consists of an aggregate set of (partly) separated markets with an enormous variety and complexity of labour activities. In particular one needs to distinguish between a market for unskilled and skilled labour, under the assumption that skilled people can perform unskilled work, but not vice versa.

In the literature ICT is generally considered as a skill-biased technology (Berman et al. 1994; Autor et al. 1998). The increased use of ICT in the production of goods and services has thus caused changes in the demand for skilled versus unskilled labour and hence influenced their relative prices. The introduction and implementation of ICT in the production process often requires highly specialized ICT workers that are able to install hardware, software and build networks. Furthermore it requires skilled employees which can develop the most productive and profitable application of ICT. ICT is facilitated largely by a substantial supply of skilled labour, and as a result drives up the reward of skilled labour relative to the wages of the unskilled. ICT also substitutes for certain types of functions, because the computer takes over tasks that were previously executed manually. Hence manual administrative and accounting and computing tasks can be reduced. Various types of personal communication are being replaced by digital communication. Hence the application of ICT increases

the relative price gap between skilled and unskilled labour, as it saves on unskilled labour thereby reducing the unskilled wage rate.

Some scholars have attributed (part of) the increased income inequality in several industrialised countries since the 1970s to the introduction of ICT (Levy and Murnane 1992, Borghans and ter Weel 2003). DiNardo and Pishke (1997), however, cast some doubt on these views. They raise the question whether high wage differentials for on the job computer use really display a return to computer skills, or just reflect the fact that high-wage workers use more computers for their job. We can extend these concerns by pointing out that ICT is typically a General Purpose Technology that can, depending on the relative endowments and prices of factors, be applied and directed towards different factors of production, including unskilled workers. ICT also creates many possibilities to produce new products and services that are profitable primarily because they satisfy a latent demand and create new markets. Hence apart from the efficiency gains directly resulting from factor reallocations towards skilled labour, it can be perceived that ICT is also used in those product markets that use abundant and cheap unskilled or semi-skilled labour.

As the basic skills to handle ICT can be rather straightforward for anyone who can read and write, Beaudry and Green (2002) suggest that developing countries can profit largely from the new technology. They argue that the large decrease in the price of ICT can create a comparative advantage for economies with rapid population growth to jump ahead in the adoption of computer and skill-intensive modes of production. This strategy enables them to counter the relative scarcity of physical capital. In sum, it is still very hard to indicate in which respect ICT will eventually change relative factor demand. The employment growth effects of ICT are very diffuse, but there is an inherent possibility to apply ICT in such a way that it serves the economy-specific structure of factor endowments, including support for the creation of more productive jobs in countries starting with a surplus of low-skilled labour.

Recently the ILO has addressed the opportunities of ICT for developing countries in terms of employment and productivity growth in their *World Employment Report 2001* (ILO 2001). In analysing how new technologies influence the quantity, quality and location of work, it has looked at where jobs will either be lost or created. The report focuses on the growing fear that, if current trends persist, the new technologies will worsen national and global inequalities, especially the wealth gap between the world's rich and poor countries (the “digital divide”). The Report addresses the concerns and suggests new important strategies for development. In particular the importance of education, learning and training is emphasised and it is shown how these factors can help developing countries succeed in the information economy and the creation of decent work.

The total supply of skilled labour depends to a large extent on the capacity of the educational system and the facilities that support learning and the acquisition of experience in the business environment. In general the relative supply and demand for skills is higher in advanced countries than in developing countries. For highly specialised skilled jobs, for instance in technical, medical and educational professions, demand and supply can be very uneven for a long period. Shortage of supply is caused, for example, by a low inflow of students or a shortage of training facilities in these professions. Educating people in highly specialised fields requires time and it is therefore hard to respond quickly

to a sudden upward demand-shock. On the other side of the skill spectrum, the market for unskilled labour is often characterised by oversupply and much more vulnerable to sudden downward shocks in demand. A possible undersupply of unskilled labour can be compensated by allocating skilled labour to low-skill jobs, which causes underemployment but possibly avoids unemployment.

3.4 The Role of Income Distribution[28]

An important determinant of the relationship between productivity growth and employment creation is the distribution of income within a country. Income distribution may be directly related to productivity as the former can be negatively affected by skill-biased technological change as described above in Section 3.3. On the other hand, we have argued in particular in Chapter 2 that in the long run increased social capabilities are strengthened by a broad and equal access to basic facilities such as education and health which would be supported by a more equal distribution of income. In combination with aggregate growth of GDP, a more equal distribution of income also raises the share of people in the middle-income class which includes those that have the highest income elasticity, the highest savings rates and who are the biggest investors in education.

Recently much has been written about the distribution of income in relation to economic growth (Deininger and Squire 1996, Barro 1999, Melchior 2001, Sala-i-Martin 2002). This literature finds as much empirical evidence in favour as against the hypothesis of the inverse U-curve of income equality (Kuznets 1955). This hypothesis states that the relationship between income inequality and economic growth tends to be positive in early stages of growth and turns negative when countries become more advanced. Apart from the actual relationship, the causality of the relationship has also been a matter of fierce debate.

Hence the relationship between *personal income distribution* and economic growth is conditional upon a range of other factors. From the perspective of this study, it is most useful to concentrate on the renumeration of the production factors labour and capital, i.e. the *functional distribution of income*, and its possible relationship to productivity growth. Compared to the literature on personal income distribution, much less has been written about the functional or factor distribution of income beyond classical and neoclassical growth theory. Along a path of balanced growth as stipulated in the neoclassical growth theory, the returns to private investment and the capital/output ratios are assumed constant. This implies that the income shares of accumulated factors, such as capital, remain constant in the long run.[29]

But when related to structural change, which requires a medium run focus, factor shares should be allowed to change over time. For example, during the early phase of structural change, when strong investment is required, it may be expected that the capital share will increase relative to the labour share. Later on when labour productivity increases and wages begin to rise, the labour share may increase again. This process is also strongly related to the different intensities at which sectors make

[28] This section is largely based on the master thesis by Hedwig Duteweerd (2003), University of Groningen.

[29] Scitovsky (1964) and Lebergott (1964) are devoted to a general consideration of the determinants of factor shares in the long run.

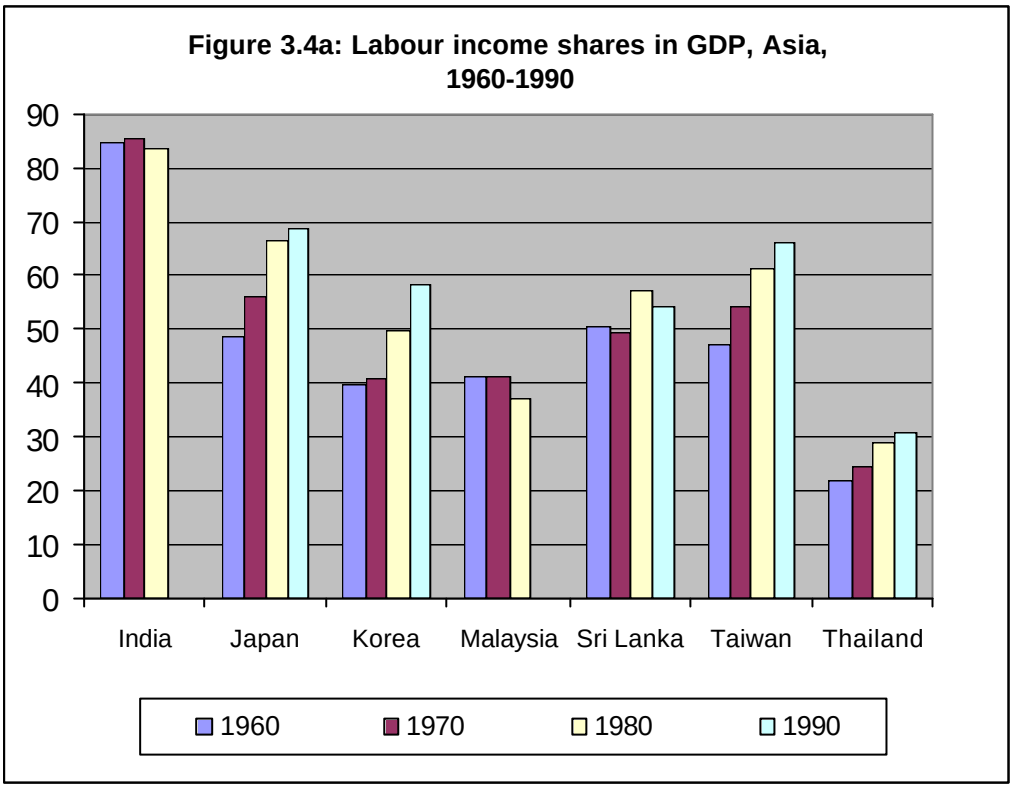
use of production factors. For example, the agricultural sector is typically intensive in use of labour and land, while industry is intensive in use of labour and capital (see also Chapter 4). Much also depends on whether technical change is labour or capital biased, and whether it primarily uses skilled or unskilled labour.

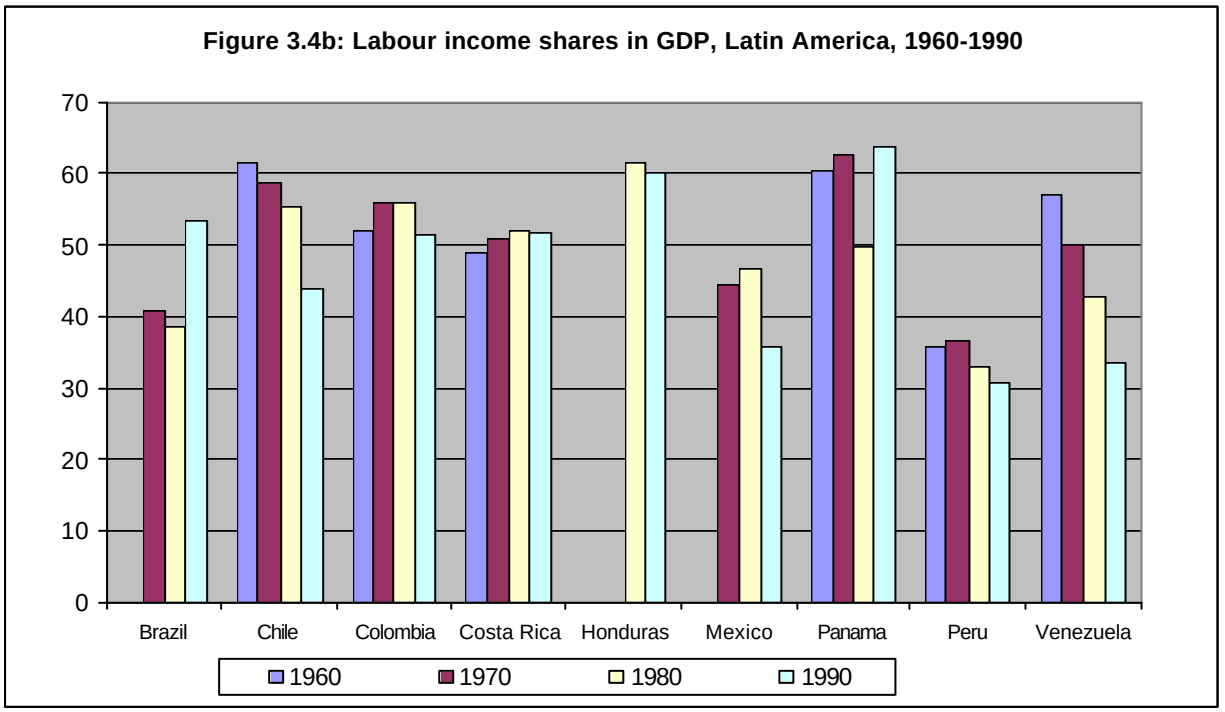
Unfortunately the evidence on functional income distribution is limited, and subject to major empirical problems. Essentially, the measures on labour income are derived from the national accounts, and capital income is obtained as a residual from value added and labour income. These measures are affected by inconsistencies concerning the exact methods to obtain labour compensation in the national accounts. Moreover, the capital income shares still include the operational income from self-employed persons, as the latter is not defined as wage income. A crude method, which is to impute the income of self-employed persons on the basis of the wage incomes of employees, has its obvious shortcomings.

Despite these problems, a comparison of the development of labour income shares between a number of Asian and Latin American countries from 1960 to 1990, shows some interesting results (Figures 3.4a and 3.4b). In 1960 Asian countries, on average, started off at similar or even somewhat lower labour income shares in GDP than in Latin America. But most Asian countries showed a strongly increasing trend in labour income shares between 1960 and 1990. For example, Japan, Korea and Taiwan all had labour income shares of between 60 and 70 percent of GDP around 1990. Two Asian countries stand out, namely India with a very high labour income share and Thailand a very low labour income share. In India the reason is obviously the dominant agricultural sector, which has accounted for more than 70 per cent of Indian employment until recently. The low labour income share in Thailand is probably due to the large number of farms with – for Asian terms - relatively high land-labour ratios and the smaller number of farm workers relative to other countries. However, during the process of structural change the labour income share has increased as in other countries.

In contrast to Asia, Latin American labour income shares have not shown the same increase. Instead these shares mostly kept fluctuating around the original level of 40-55 per cent. In some countries (for example in Venezuela, Peru, and Chile) there is even a slight downward sloping trend in the labour income share.[30]

[30] Obviously the labour income share typically goes up after an adjustment for the labour income of self-employed persons. Preliminary calculations tend to show bigger adjustments for Latin America than for Asia, but these results may be affected by the imputation method, which allocated a too high labour income to self-employed persons in many Latin American countries. The trends for Asia and Latin America described in the main text remain unchanged compared to the unadjusted series of capital income shares.





Note: excluding income of self-employed persons

Source: Duteweerd (2003), based on U.N. National Accounts Statistics

There are many reasons for the differences in levels and trends in capital income shares between Asia and Latin America. Some of these reasons are of an historical and institutional nature and relate to relatively high initial land-labour ratios, greater inequality in the distribution of land or – for example in the case of Venezuela – large mineral reserves. But the differences in trend are also related to the dynamics of the process of economic growth in Asia and Latin America. Although more research is needed to establish these patterns more precisely, some plausible hypotheses can be posed.

Firstly, the relatively high income shares in Asian countries around the 1960s may in fact represent the first industrialisation phase, during which capital intensification became more important. As capital was still relatively expensive compared to the renumeration of labour input, which was largely drawn from the agricultural sector with low wage incomes, the capital income share rapidly increased. During the second industrialisation phase in Asia (during the 1980s and 1990s) the quality of labour rose, labour productivity and wages increased rapidly and eventually offset the relatively higher renumeration of capital. The latter incidentally became cheaper under the influence of technological change and international capital flows, which made capital a more abundant source of productivity.
Secondly, in Latin America the growth process was slower and frustrated by several crises and imbalances in the growth process. Low-skilled labour remained the abundant source of production, and the relative price of capital to labour did not decline much.

The striking conclusion of this comparison of labour income shares in relation to the patterns of productivity and employment growth described above is that, despite a relatively capital-intensive nature of production processes in many Latin American countries, they did not realise the same growth rates of labour productivity as many Asian countries during the period 1960 to 2000. The latter managed to raise the share of labour income, increase labour input while at the same time generating more resources to support output and productivity growth. These differences have had important implications for the direction of technological change, which in Asia has been typically focused on the complementarity of capital and medium and high skilled labour. In contrast, in Latin America technological progress is likely to have been more biased towards physical capital in combination with low skilled labour. Hence the trade-off between productivity and employment growth has been more strongly present in the latter case.

In conclusion, low labour income shares are on themselves not indicative of a strong trade-off between productivity and employment growth in the medium run. But the change in such shares are indicative of structural changes, and the direction of technological change which determine the growth patterns of individual countries.

3.5 Conclusion

In this chapter we identified the conditions under which a trade-off may occur between productivity and employment growth. The empirical evidence showed that, at least in the medium run, such a trade-off can be widely observed. However, there are many instances where the trade-off has been tackled and turned into a positive relationship. In this respect, the 1990s have shown to be a somewhat better period than the 1970s and 1980s.

We also reviewed the literature on the role of labour market rigidities and factor input biases in explaining part of the trade-off. The degree of flexibility and rigidity appears to influence the response of employment to increases and decreases in productivity. Recent technological change, in particular ICT, has had a tendency to reduce the demand for low skills, although the general purpose technology nature of ICT has also generated potential for using low and medium skills in ICT applications.

The comparison of capital and labour income distribution between Asia and Latin America showed how Asia, despite generally lower labour income shares, has been successful in raising labour productivity faster than in Latin America of the past four decades. Indeed technological change directed towards an increased use of skilled labour is not by definition detrimental to low income countries, but instead provides important opportunities to reform the economy towards a greater demand and supply of better paid, more productive and decent jobs. This reform process is part of the process of structural change, that will be discussed in Chapter 4, and is dependent on the institutional environment to realise the opportunities created by the new technologies (see Chapter 5).

4. The Role of Structural Change

4.1. Introduction

Underlying the process of long run aggregate productivity and employment growth (Chapter 2) and distortions to this process leading to trade-offs in the medium run (Chapter 3), is the process of structural change. In this chapter the role of structural change, which essentially represents the shift of resources from low to high productivity activities, will be examined in more detail.

By decomposing trends in employment, productivity and output at sectoral level it can be revealed that the medium run trade-off mostly reflects a Schumpeterian type of "creative destruction", as the jobs that disappear were often characterised by relatively low wages in sectors that show declining productivity. Job creation in the growth sectors aligns the possibility of productivity growth, rising real wages and improving labour conditions. This process leads to the virtuous cycle in which higher returns on labour can be used to further raise the skill-level of workers which again stimulates labour productivity. This way labourers benefit from structural change directly through higher incomes and indirectly via enhanced abilities.

Unfortunately these positive effects of structural change are not always immediately visible. Structural change by definition implies imbalances and adjustment costs. Where new opportunities arise, some people will lose their jobs and other will find new employment. The faster the economy transforms, the faster capital and knowledge becomes outdated and economically worthless. The distributional effects of structural change can threaten the relative wealth of those in the traditional sectors of the economy. Persistent capital-biased patterns of production can offset the potential gains of labourers when the returns of investments only accrue to a small elite of capital owners and are not reinvested in the economy. On the other hand, an institutional bond between capital and labour might also improve workers' wealth when the higher returns on capital are passed to them by way of higher wages or (due to technological changes) through lower prices of the products they buy. But if the labour market for highly productive jobs in the formal economy stays restricted to those who are already inside the formal labour market, large groups of labourers from the informal economy will not be able to benefit from the structural change process at all.

The key question therefore is not so much whether structural change is favourable for economic growth or not, but rather which particular patterns of structural change help to minimise the economic costs of the trade-off between productivity and employment. It will turn out that the strength of the social capabilities base greatly determines the success of structural change in the long run and reduce the damage in the short run.

In Section 4.2 the factors that determine sectoral employment opportunities are addressed and ordered systematically. This provides a framework that can be used to evaluate diverse patterns of structural change and their subsequent effects on employment creation and destruction. These characteristics determine the elasticity of labour input. Factor substitution possibilities and the potential to capture economies of scale appear to play a crucial role here.

In Section 4.3 the sectoral trends in employment and productivity are analysed. This section draws heavily on data from the GGDC/KILM database (Chapter 18). Special attention is given to the extent and timing of sectoral employment-productivity trade-offs. Further the development of employment and productivity on a 10-sector level and on a 60-industry level will be addressed, providing an even more detailed insight in the nature and consequences of the trade-off. Finally, the impact of technological change and especially the impact of ICT on the growth performance will be addressed.

Section 4.4 deals with the role of the informal economy in the process of structural change. It is argued that the informal economy can potentially positively contribute to the dynamics of structural change. Firstly, it can be an important source of employment creation. Secondly, it can also become a contributor to economic growth by offering products and services for consumption at a lower price and quality to a poorer part of the population. Thirdly, the informal economy can also play an important role as a supplier at the lower end of the vertical (global) supply chain and as such contribute to productivity growth elsewhere in the economy.

4.2. Opportunities and Constraints for Sectoral Employment Growth

In the long run economic growth is essentially driven by technological and organisational (or social) innovations and by the capacity to adopt and adapt to innovations. However, employment responses to innovations tend to vary greatly by sector. Employment does not always flow in the direction of high productivity activities as it can also be scrapped through factor substitution effects. The analytical framework we use here focuses on the question which sector specific characteristics determine labour input elasticity. For each sector we need to analyse whether growth is labour-saving, labour-neutral or labour-augmenting and which particular forces determine this. Shortly the forces determining sectoral employment can be categorised in four groups: 1) factor endowment characteristics; 2) technical characteristics; 3) market characteristics; and 4) institutional characteristics. Although these forces are not fully independent, we will deal with these in respective order below (Vandenberg 2003).

Factor endowment characteristics

From a supply-side perspective, the relative endowments of production factors such as land, natural resources, labour and capital impact their relative prices. Labour abundant economies tend to develop production processes that are less capital-intensive than labour scarce economies. For example, historically the USA have become known as a typical capital-intensive economy, whereas the EU economies are traditionally biased towards a more intensive use of labour. Extensive agricultural development in Latin America as compared to the intensification of agriculture in Asia is also heavily influenced by the relative abundance of land in Latin America and its scarcity in Asia. Hence the relative endowments of land, labour and capital inputs are important in determining net employment growth via the relative factor prices.

The precise employment effects also depend on the path of technological and organisational innovations by sector. On the one hand technologies can be developed in the direction of substituting the scarce factor, either capital or labour, to enjoy the lower factor costs (price-effect). On the other hand technological change can be directed towards the abundant factor, as the effect of a large market

size based on low comparative costs attract technological developments (market-size effect) (Acemoglu 2002).

The effects of the endowment structure on the demand for labour is thus connected to technological change. Another important factor is the differential labour elasticity of unskilled and skilled labour. Although technological development is seen as the main factor that determines relative prices, the relative shares and prices are also affected by the international environment which is shaped by patterns of trade and foreign direct investment.

Technical characteristics

The production of some goods and services by nature require a labour-consuming process, whereas other goods and services require a large deployment of capital. This depends on the technical characteristics of the product (or service) and the production process. In contrast to scale-intensive and capital-intensive manufacturing industries such as the automobile, chemical and electronics industries, many social and personal services such as education and health care require large amounts of labour. In general, products that can be easily standardised and assembled allow for a great deal of mechanisation and automation. These production processes are typically capital-biased and make predominantly use of unskilled labour. The more differentiated, complex and creative the production process is, the more intermediate and higher labour skills are demanded. The latter development is characteristic of the rise of the knowledge economy during the past decade.

But technological and organisational changes can bring about factor substitution which changes the capital-labour ratio. In general factor substitution can take three distinguished forms:

1) Innovation substitutes labour for capital. This is especially the case with mechanisation and automation of production processes and results in a negative effect on employment growth. The incentives to save on labour input can result from an increase in the costs of labour (wages) relative to capital (rents and depreciation) or from opportunities of economies of scale depending on the possibilities for standardisation and also on the market characteristics such as size and growth prospects.
2) A negative employment effect of labour-saving innovations can be reversed by a simultaneous increase in productivity and output, lowering the prices of the product and increasing demand. Hence expansion of production creates new employment which compensates the substitution-effect. Especially in growing industries which capture large economies of scale, efficiency is often raised by increasing the output-input ratio via output growth rather than economising on inputs. Labour input elasticity is thus determined by counteracting forces as capital accumulation can both complement and substitute for labour.
3) The third possibility is that technological change is complementary to labour. Labour-enhancing technological change mainly applies to skilled labour. This is known as technology-skill complementarity. An example of this type of technological development is the application of ICT that partly substitutes computers for people, but also requires more skilled labour to realise the productivity and output growth potential of ICT. During the post war era structural change mostly ran in the direction of higher technology activities that required a continuous upgrading of human capital levels. However, technology can also replace skills though. With the introduction of the factory-system in the nineteenth century, new technologies of mass production replaced traditional artisan skills as unskilled labour at the assembly line became the dominant source of employment growth. Skilled labour can thus be substituted for unskilled labour and vice versa. (Goldin and Katz 1999, pp. 693-694).

Market characteristics

So far we have regarded structural change largely as a supply-side driven process, based on innovations that raise efficiency and productivity. The dynamics of the market environment, such as changing demand patterns and preferences also enhances structural change and impacts on labour

input elasticity. The interdependence between the technical aspects and market characteristics is especially strong when there are possibilities to capture economies of scale. Scale is directly dependent on actual and potential market size and subsequent investment prospects, and demand characteristics of products are largely determined by the income levels of consumers.

When income per capita increases, people change positions on their utility curves and develop new demand directed towards luxury goods and services. Particularly important in this respect is Engel's law, stating that with an increase in income people spend comparatively less on primary products, putting a natural break on the growth opportunities of the agricultural sector. The demand for agricultural products thus stems largely from population growth, whereas luxury goods depend more on the income level of the population.

In fast growing sectors of the economy, plenty of opportunities exist for producing more diverse goods and greater variety supporting growth and job creation. These industries continuously strive to capture larger shares of the consumer's budget. Indeed there are striking differences between the mass production and consumption of standardised products produced in former socialist economies with the preferences of consumers being largely ignored, and the rise in demand for differentiated products in the western advanced world. Also the formal economy in many developing countries is undergoing a transformation away from producing low-quality standardized products to greater variety and variation in quality levels of products and services. These developments have required a large transformation in production organisations away from standardised production to more intensive use of human capital substituting for fixed capital.

Institutional characteristics

The impact of the institutional environment on labour input elasticity is very complex and much less visible than the influences of endowment, technical and market characteristics. Here we restrict ourselves to some major institutional effects by drawing a distinction between macro-institutions and sector-specific institutions.

Labour market policy is a typical example of a macro-institution that embodies both general and sector-specific outcomes. Labour market regulations influence the cost-benefit calculations made by employers in their decision to attract or lay off employees. These decisions are conditioned by institutional factors, including wage regulations, taxes, insurance policies and employment protection rules. These rules determine the extent of labour market flexibility. In general the political choices concerning the extent of flexibility of the labour market are determined by how policy makers and interest groups think about the trade-off between the virtues of labour protection and economic competitiveness.

Commercial and capital market institutions can also severely impact on the climate to trade and invest. This does not only concern the limited amount of capital in developing countries. This even may not be the main problem, which is more likely the immobility of capital due to costly and timely bureaucratic procedures, that obstructs capital reallocation (de Soto 1999). Capital-market imperfections can be reduced by institutional changes alternating the risk-calculations made by banks

or other lenders. Institutional change can enhance investment and stimulate entrepreneurship and structural change. An important example is the provision of short term loans to small scale enterprises in many developing countries. The investment climate directly impacts on the possibilities of the informal economy to raise productivity, output and enter the formal economy.

Sector-specific institutions are linked to both positive and negative externalities of particular industries. The positive effects mainly relate to the support of firms in their innovative behaviour through facilitating co-operation between themselves as well as between firms and the public knowledge sector. Industries that are supported in their innovating process often experience positive employment effects, although it can be offset by too strong patenting laws that restrict diffusion of innovations to new firms.

Well known examples of negative externalities are regulations with respect to the production and trade of military equipment, the preventive measures against pollution and restrictions placed on the production and trade of products that have a bad influence on society in general, for instance the discouragement of the consumption of tobacco and alcohol. Although the long run effects of these measures on employment growth cannot be easily determined (and might well be positive by inducing changes towards new types of production and consumption), in the short run these restrictive measures in general exert a negative employment effect on the sector in question.

The role of government in subsidising and protecting employment in less competitive industries may impact employment positively in the short run, but are almost always ineffective in the medium and long run. A notorious example is the manipulation of the terms of trade of agricultural products between the advanced and developing world. It has hardly slowed down the declining share of agriculture in total employment, but seriously affected the potential of low income countries to exploit their comparative advantages. Flows of subsidies are largely influenced by lobbyist campaigns and the sensitivity of political power to live up to the demands of specific (social) groups. The fear of social unrest and social costs raised by growing unemployment figures is for many politicians a reason to protect uncompetitive industries. As political planning is largely determined by the terms stated for re-election, these measures tend to be directed at the short term. The question then is how short term protectionist tendencies can avoid frustrating the medium and long run perspectives for growth. This subject is too broad and complex, going beyond the scope of this paper, to conclude anything in general about the (un)desirability of economic protection.

4.3. Sectoral trends in Employment and Productivity Growth

Sectoral employment trends from 1950 onwards

Structural change has occurred in nearly all countries in the world. Table 4.1 shows the general directions of the sector distribution of employment as well as the growth rates of employment can be derived from 1950 onwards. The first thing to note here is the enormous increase in absolute employment numbers between 1970-1990 when compared to the period 1950-1970, caused by the demographic transition and the post-war baby boom.

In all regions a considerable shift has taken place away from agriculture towards the non-agricultural sectors of the economy, i.e. industry and services. On balance the service industry attracted the largest share of the increasing pool of labour, whereas the employment trends in industry diverged quite substantially between the advanced regions on the one and the developing regions on the other hand.

Table 4.1: The sectoral distribution of employment by region, 1950-1990

	Total Employment (1000)				**percentage distribution (%)**		
	Agriculture	Industry	Services	Total	Agriculture	Industry	Services
Europe							
1950	100360	81015	72072	253447	40%	32%	28%
1970	64120	123563	116581	304264	21%	41%	38%
1990	42496	126345	179878	348719	12%	36%	52%
North America							
1950	9389	26711	36767	72867	13%	37%	50%
1970	4518	31731	61922	98171	5%	32%	63%
1990	4128	37003	101348	142479	3%	26%	71%
Oceania							
1950	1737	1678	1975	5390	32%	31%	37%
1970	1964	2499	3865	8328	24%	30%	46%
1990	2563	2857	7419	12839	20%	22%	58%
East and South East Asia, excl. China							
1950	95191	15007	24729	134927	71%	11%	18%
1970	104620	34240	54793	193653	54%	18%	28%
1990	135283	62191	108063	305537	44%	20%	35%
Asia							
1950	578785	51688	79082	709555	82%	7%	11%
1970	699140	124841	167168	991149	71%	13%	17%
1990	964963	263750	331787	1560500	62%	17%	21%
Latin America and the Caribbean							
1950	32573	11559	16015	60147	54%	19%	27%
1970	40107	21145	34140	95392	42%	22%	36%
1990	44515	41364	89326	175205	25%	24%	51%
Africa							
1950	87020	6553	11547	105120	83%	6%	11%
1970	120347	14178	24324	158849	76%	9%	15%
1990	167043	29384	69391	265818	63%	11%	26%
World							
1950	809864	179203	217457	1206524	67%	15%	18%
1970	930196	317957	408001	1656154	56%	19%	25%
1990	1225709	500702	779448	2505859	49%	20%	31%

Source: ILO, Economic active population, 1950-2010

In most developing countries the shift out of agriculture resulted in a decreasing relative share of agricultural employment, although the absolute number of jobs in agriculture has continued to increase. In Europe, North America and Oceania there was also an absolute decline in agricultural employment. The absolute decline in agricultural employment is considered to be an important turning point in the process of structural change. It means that agricultural productivity growth is sufficient to sustain the food supply of growing numbers of people without any additional labour input. This removes the increasing pressure of labour on a more or less fixed endowment of arable land and breaks the Malthusian threat of diminishing returns to agricultural labour and decreasing productivity rates (Fei and Ranis 1997).

Industrial employment trends also show a distinctive pattern for the developed world and the developing world. In Asia, Africa and Latin America the relative share of industrial employment increased gradually. In contrast, the relative share of industrial employment in the developed world reached a turning point. In Europe the industrial share has declined since the 1970s, whereas in Oceania and North America this trend was already visible since the 1950s. The absolute numbers of industrial employment have also slowed down considerably and have even turned negative in a number of advanced countries although this trend has not shown up in the aggregate figures yet.

The shift of employment towards services can be stated as a "stylised fact" of post war economic development (Kuznets 1965). The transfer of labour to services is a very diverse process though. Firstly, economic growth in general implies an increasing contribution of services as a response to an increased demand for trade, transport, communication and social services. This service employment growth effect can be considered partly as a classic type of economic development based on the integration of markets and the increase of scale enhancing specialisation and the division of labour. As a result many service activities have become independent activities, outsourced from the agricultural and industrial activities in which they were once embedded.

Secondly, services can also arise as a result of the rise of the welfare state, giving a large role to health, education, government and social services. Finally, employment growth in the service sector can result from a lack of productivity growth in the rest of the economy. In particular demographic pressures in rural areas lacking sufficient employment opportunities, have caused large flows of rural-urban migration. These migrants were mostly absorbed by the urban informal service economy. The service sector more easily absorbs hidden unemployment than the industrial sector, because of the possibilities of small-scale and low capital intensive work.

There have been substantial discussions in the literature on the possibilities for the service sector to raise productivity. One argument is that there are inherent problems of increasing productivity growth in services (Baumol 1967). But there is increasing evidence that at least part of the service sector (in particular the market services) profited from technological and organisational innovations enhancing productivity growth.

The productivity – employment trade-off in agriculture

In figure 4.1 the relationship between employment and productivity growth in agriculture is visualised for three subperiods, 1961-1973, 1973-1990 and 1990-2000. The data, derived from the GGDC/KILM

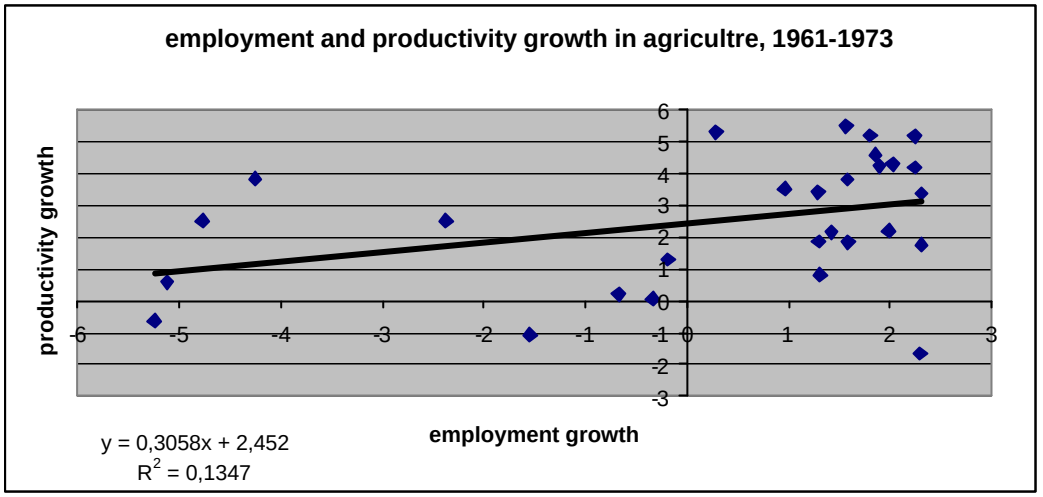
18 database covering approximately 100 countries from 1961, display an increasing number of observations over time (due to larger data availability). For all periods there is a mix of developing countries and OECD countries covering all world regions. From the trendlines added to the scatter diagrams the eventuality of an employment-productivity trade-off can be derived.

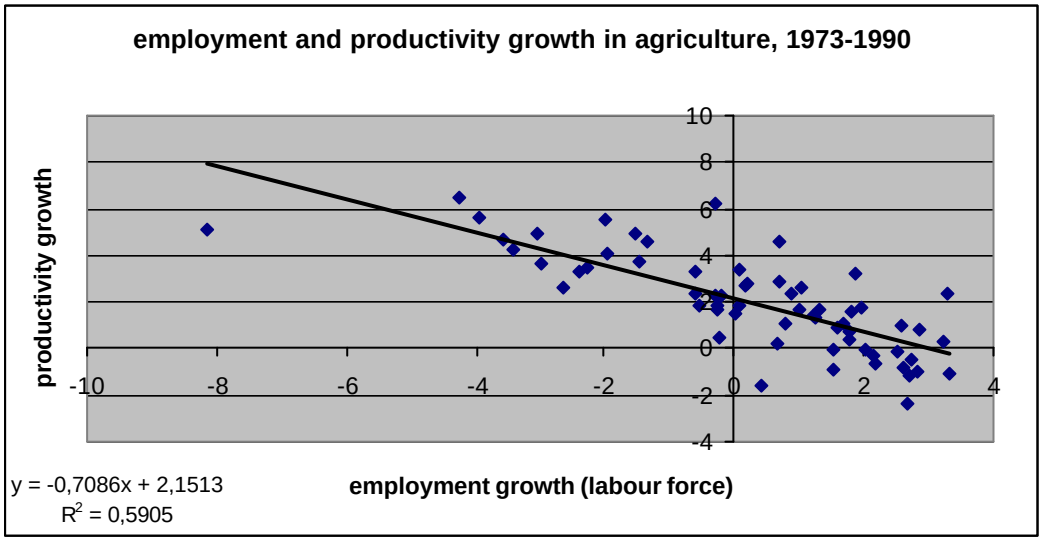
During the post war era the global trends in agricultural employment and productivity changed substantially in the direction of a trade-off. In the period 1960-1973 the developing countries in Asia, Latin America and Africa caught up with the developed countries in terms of labour productivity while avoiding the trade-off. In OECD economies the employment-productivity trade-off was already present during this period. In next two periods from 1973-1990 and 1990-2000 the trade-off becomes visible on a global scale, in spite of many exceptions.

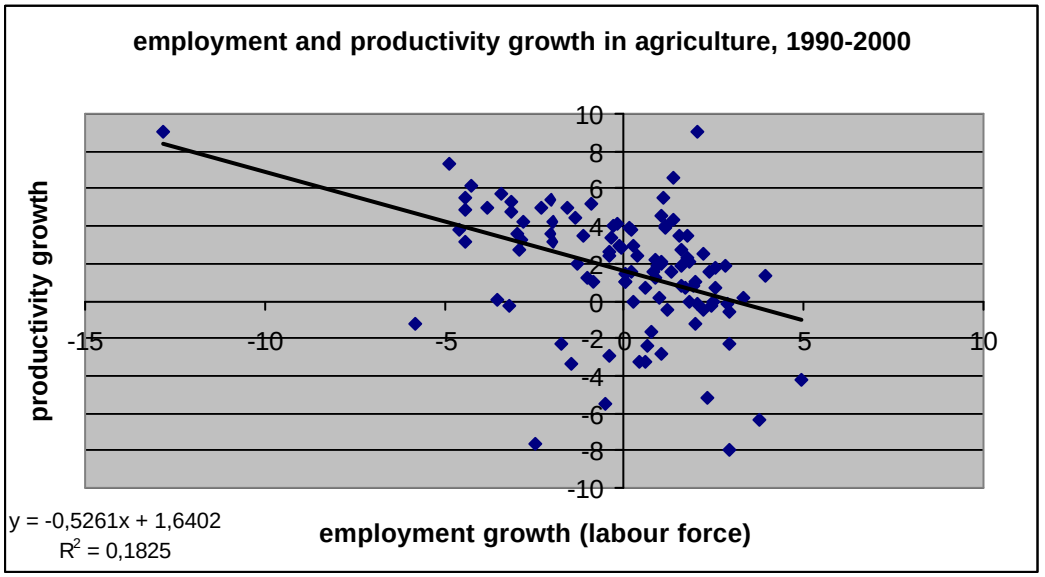
The trade-off is a clear case of factor substitution. The opportunities of mechanisation and the use of industrial inputs (high yielding varieties, fertilisers, etc) have led to specialisation and enlarged scales of production. This has caused capital deepening at the expense of labour, although there are large differences in the direction of technological change depending on the original land-labour ratios which highly differ between countries (Hayami and Ruttan 1985). Obviously the reversed expansion-effect has not been large enough to prevent large employment losses. Especially in countries with low levels of population growth the demand for agricultural products has only increased marginally.

The trade-off in the agricultural sector was strongest in the OECD and East and Southeast Asian countries grouped at the left end of the trendlines. High productivity growth rates went at the expense of employment. It must be noted, however that, because of the already relative low number of jobs in agriculture in the OECD-economies, the negative effect on total employment creation was quite limited.

Figure 4.1: Employment and Productivity growth in Agriculture







Source: Groningen Growth and Development Centre and ILO (2003), KILM 18.

Whereas the East and Southeast Asian countries developed their productivity potential in the agricultural sector quite successfully - some countries like Korea and Taiwan have passed the turning point towards an absolute decline in agricultural employment -, many developing countries in Africa and Latin America have faced severe problems in turning structural change into faster growth. There are several reasons for this, related to factor endowment, technical, market and institutional characteristics described above

Factor endowments in agriculture are biased towards cheap labour hampering factor substitution. Low wages prevented the introduction of machines and embodied technology. Lacking opportunities in the non-agricultural sectors also force people to gain a living in the rural areas. In this respect the agricultural sector also served to a certain extent as a safety net for unemployment, keeping people employed at (nearly) zero marginal productivity. In combination with continued population growth, these developments explain why employment in agriculture still increases.

Although for most of the African countries, land-labour ratios were much higher than in Asia, indicating comparatively less pressure on resources, agricultural development failed. The demographic transition in Africa turned out to be a curse instead of a gift (see Chapter 2). Besides, many African and Latin American countries have specialised in quite one-sided production structures, depending heavily on labour-intensive cash crops such as coffee, or mineral resources such as oil or metal ores. Most of the primary products were continuously facing declining terms of trade. Lacking alternatives have pushed farmers to work even harder and produce more for already oversupplied international markets. As these countries are still before the turning point of relative to absolute employment decline, the pressure on land and the environment increases.

During the 1990s the transition countries have moved towards the southwest quadrant in Figure 4.1, combining employment losses with negative productivity growth. This worst case scenario is the direct effect of the dismantling of the former large scale communal enterprises. The trend witnessed on the aggregate level is thus also visible at the sectoral level. Privatisation has led to a dismantling of capital, the breakdown of communal agricultural infrastructure, such as irrigation networks and scrapping of heavy machinery that were only effective in large scale farming. Foreign competition has put the domestic sector even further under pressure.

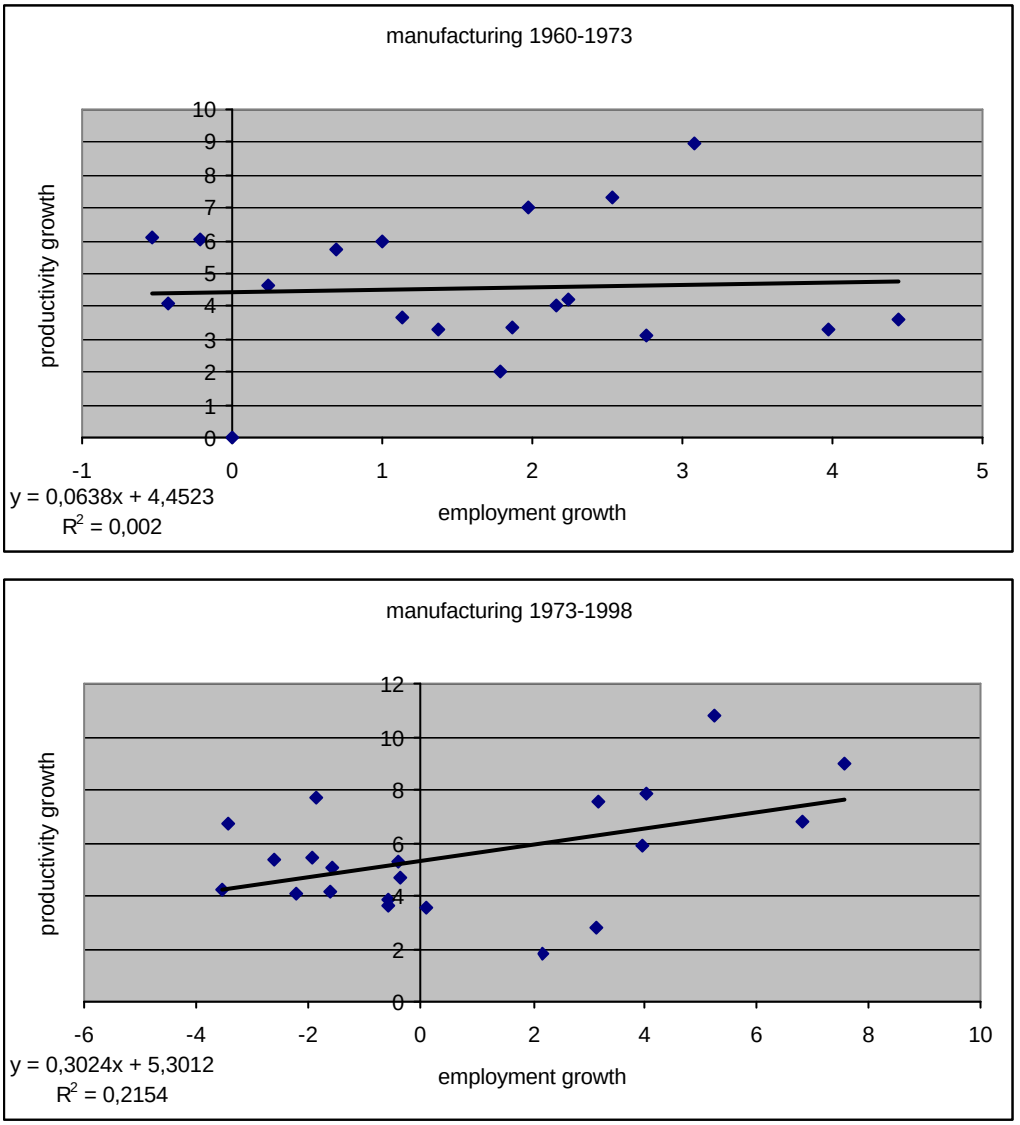
Diversity in trade-offs in manufacturing

In the manufacturing sector trends have become very disperse in recent decades. During most of the 20th century manufacturing output growth profited strongly from continuous increases in demand and the large possibilities for mass-production and inherent economies of scale. Figure 4.2 even shows that for a more limited sample of 22 countries (compared to over 100 countries in agriculture) a slight trend towards a somewhat stronger positive employment-productivity relationship (hence no trade-off) can be witnessed. At the same time, however, the number of countries in the northwest quadrant of the diagrams increased from 3 during the 1960-73 period to 12 countries from 1973-1998. The latter group mainly includes OECD countries in major Europe and North America, but also Japan, Korea, Hong Kong and Singapore. The absolute decline of manufacturing jobs marks the transition of industrial growth based on a combination of factor substitution and expansion towards a process of rationalisation and downsizing. In other words, the factor substitution-effect was not longer compensated by overall expansion.

This transition was accompanied by fundamental changes in the industrial production organisation from mass-production to lean and flexible production formats. Parallel to this transition the business service sector also became gradually more specialised, which led industrial enterprises to outsource traditional in-house service activities such as administration and accounting. This trend adds to the shift of employment towards services. As a result of the economising on labour, labour productivity growth in manufacturing has continued to increase.

As more and more countries beyond major Europe and North America have begun to build up a sizeable manufacturing industry, international competition has increased and caused further specialisation. In the past decades the newly industrialising economies in Asia (Korea, Taiwan, Hong Kong, Singapore, Indonesia, Thailand, Malaysia) and to a lesser extent the reforming Latin American economies such as Brazil, Mexico and Chile, have entered the world market for manufactures (Crafts 2000). In line with their comparative advantage, the newly industrialising economies have specialised more in labour-intensive manufactures (Wood 1994). However, the characteristics of Asian industrial development have also changed gradually from labour-intensive towards capital-skill-intensive manufacturing. Modern high-productive sectors created new employment opportunities, whereas capital was substituted for labour in lower value added sectors. Indeed high productivity growth rates have spurred structural change and caused severe trade-offs in several industries. At the aggregate level, however, manufacturing employment in Southeast Asia continued to increase until the late 1990s.

Figure 4.2: Employment and productivity growth in manufacturing, 1960-1998



Source: Groningen Growth and Development Centre and ILO (2003), KILM 18.

Within manufacturing, which is a key recipient of technological innovations, structural change played an important role. In the developed world in general high value added and technology-intensive sectors increased at the expense of low value added, labour intensive and low technology activities. This brought about a substantial substitution of skilled for unskilled labour, as skilled labour is much better suited to fit differentiated technology intensive production processes. To shed more light on the impact of technology on structural changes within the manufacturing sector it is useful to review in detail the changes in the composition of the manufacturing sector.[31]

In Table 4.2 we present industry data for manufacturing taken from the GGDC 60-industry database for the European Union, Japan and the United States (http://www.ggdc.net/dseries/60-Industry.shtml). We classified the employment, output and productivity figures in three different categories of low,

[31] An alternative approach is to look at the export composition to reveal patterns of specialisation and competitive advantage in manufacturing, which will be applied in the next section.

medium and high technology-intensity.[32] This classification runs roughly along the lines of unskilled labour-biased, capital and scale-biased and skilled labour-biased manufacturing industries.

Table 4.2: Employment, output and productivity growth and shares in manufacturing industries classified by technology in the EU, US and Japan.

	European Union			United States			Japan		
	1990	2000	*1990-2000*	1990	2000	*1990-2000*	1990	1998	*1990-1998*
Persons employed (in thousands)									
Low technology	9009	7346	*-2.04*	5191	4605	*-1.20*	4278	3803	*-1.18*
share in total	27.5%	26.5%	*-1.0%*	26.4%	24.3%	*-2.1%*	27.8%	26.5%	*-1.2%*
Medium technology	15664	13853	*-1.23*	8708	9041	*0.38*	6606	6363	*-0.37*
share in total	47,8%	50.0%	*2.2%*	44.3%	47.8%	*3.4%*	42.9%	44.4%	*1.5%*
High technology	8109	6515	*-2.19*	5739	5275	*-0.84*	4531	4177	*-0.81*
share in total	24.7%	23.5%	*-1.2%*	29.2%	27.9%	*-1.3%*	29.4%	29.1%	*-0.3%*
Value added in constant prices (millions of Euro's, USD and billions of Yen)									
Low technology	259206	270754	*0.44*	254114	242832	*-0.45*	19869	16557	*-1.82*
share in total	42.9%	33.9%	*-8.9%*	39.0%	15.5%	*-23.5%*	32.6%	24.0%	*-8.6%*
Medium technology	265166	289847	*0.89*	231311	321921	*3.31*	31826	29254	*-0.84*
share in total	43.8%	36.3%	*-7.5%*	35.5%	20.6%	*-15.0%*	52.2%	42.4%	*-9.7%*
High technology	80454	237301	*10.82*	166004	1001377	*17.97*	9325	23166	*9.10*
share in total	13.3%	29.7%	*16.4%*	25.5%	63.9%	*38.5%*	15.3%	33.6%	*18.3%*
Value added per person employed (in constant prices, thousands of Euro's, USD and millions of Yen)									
Low technology	28.77	36.86	*2.48*	48.95	52.73	*0.74*	4.64	4.35	*-0.65*
Medium technology	16.93	20.92	*2.12*	26.56	35.61	*2.93*	4.82	4.60	*-0.47*
High technology	9.92	36.43	*13.01*	28.93	189.84	*18.81*	2.06	5.55	*9.91*

* EU excluding Belgium, Luxembourg, Greece and Portugal.

Source: Groningen Growth and Development Centre (http://www.ggdc.net/dseries/60-Industry.shtml

Low technology sectors are comprised of resource-intensive industries (such as the food processing, paper and basic metal industries) and of labour intensive industries (such as textiles, footwear, furniture and fabricated metal products). Medium technology sectors consist of scale-intensive industries (such as industrial chemicals, iron and steel industries and transport equipment). High technology sectors include differentiated manufactures (such as machinery and equipment, engines and turbines, electronics) and the science-based manufacturing industries (such as pharmaceuticals, ICT production, office, computing and accounting machinery, aircraft and biotechnology).

Several important trends can be derived from this way of classifying manufacturing industries. Firstly, structural change in all three countries/regions was directed heavily towards high technology sectors during the 1990s. The productivity gains in the high- technology sectors surpassed the low-tech and medium-tech sectors. In Japan the low-tech and medium-tech sectors even scored negative productivity growth.

[32] This classification was constructed by the OECD.

Growth in the high-tech sector has been mainly due to the dramatic increase in value added in office machinery and accounting equipment, and electronic valves and tubes or semiconductor industry. The enormous growth rates of output did not generate much employment, however, as these industries are typically capital-biased. In all areas there was a clear loss of employment resulting in substantial trade-offs. Jobs in low and high technology sectors disappeared faster than in medium technology sectors, that is to say the scale-intensive industries.

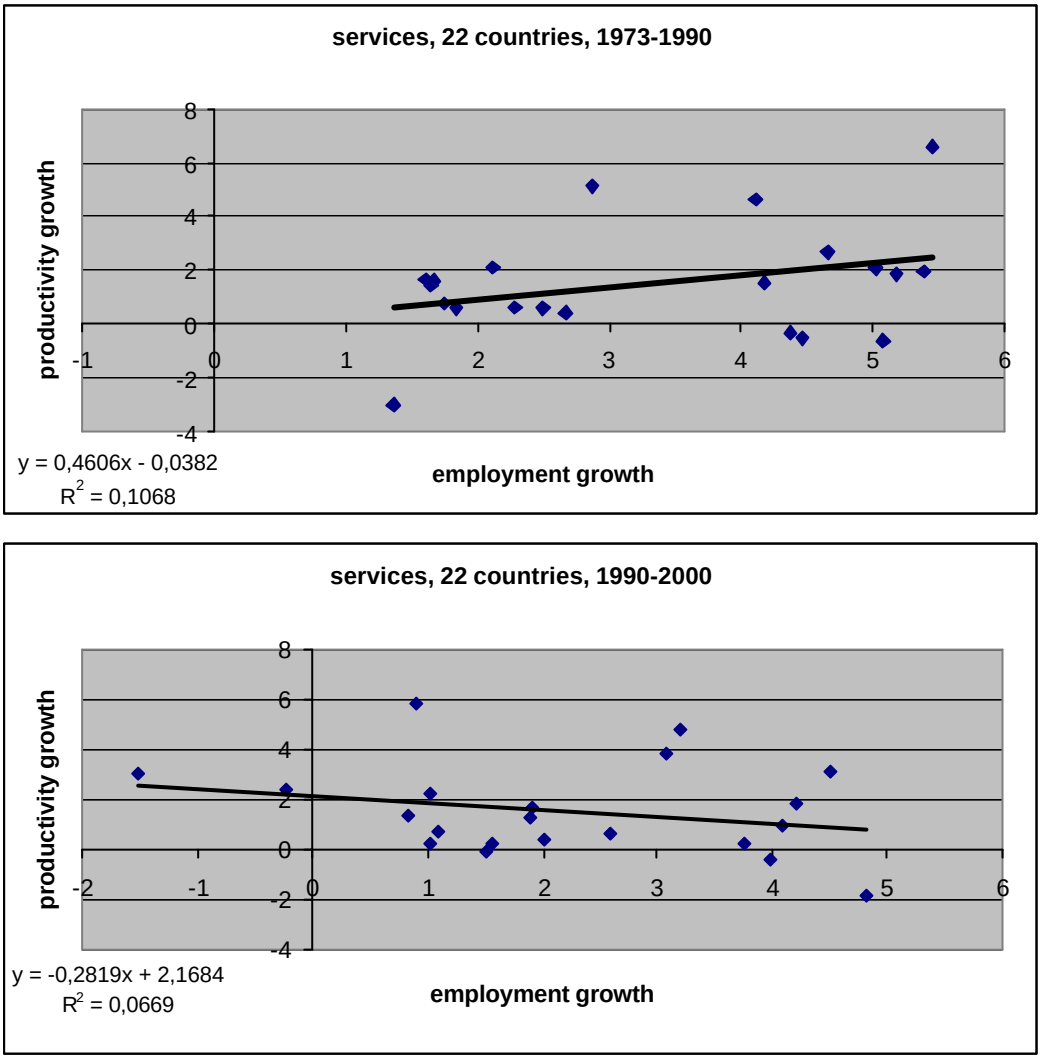
The dominant role of services in creating employment

Figure 4.3 shows that, compared to agriculture and manufacturing, on balance the service sector contributed most to employment growth in the 22 sample countries. In the 1973-1990 period all countries witnessed employment growth in services. Again the East Asian countries did very well in terms of a combined employment and productivity growth, despite the effect of the Asian crisis in 1998 on the figures for the 1990-2000 period. In the OECD countries employment increased modestly, whereas productivity growth lagged behind in comparison with the Asian countries.

Compared to manufacturing, the service sector stayed somewhat behind in terms of productivity growth in most countries. This observation has given rise to a large debate on the so called "productivity paradox". Apparently labour does not exclusively shift towards the most productive industries as most theories on structural change predict. In spite of lower productivity growth rates, the service industry was the largest contributor to net employment creation. How can this be explained?

The most important reason is that the demand for such labour intensive services as health care and education has increased as a result of the increasing welfare levels in the developed countries. Market (or scale) characteristics thus tend to influence the flow of employment largely. Inherent technical characteristics make it that substantial trade-offs between employment and productivity are less likely to occur in a great deal of service industries. Health care, education and legal services for example require a lot of labour input and especially skilled labour. This is not to say that service industries in general are unable to economise on labour, as for example ICT provides many opportunities to automate previously manual activities. But the possibilities to raise productivity have generally be seen to be limited (Baumol 1967).

Figure 4.3: Employment and productivity growth in services



Source: Groningen Growth and Development Centre and ILO (2003), KILM 18.

Nevertheless there is a substantial variation in services productivity growth rates, suggesting that Baumol's hypothesis is not an iron law. For example, concerning the development of services productivity an important distinction has emerged between the US and the EU in recent years. During the 1990s the U.S. realised a substantially higher productivity growth rate in services, namely on average 1.7%, against 1.0% of the EU countries in the sample. This growth in productivity growth was realised while avoiding an employment trade-off. In fact employment in services also grew stronger in the U.S., i.e. at 1.9% on average against 1.3% in Europe.

But differences in services productivity growth are also substantial for non-OECD countries. For example, in the Philippines, Brazil and Mexico employment growth went along with negative labour productivity growth resulting in a (reversed) employment-productivity trade-off. For all of these countries this can be explained by labour flowing in the direction of the low productive urban service sector, as a result of increasing population pressure and lagging employment opportunities in (rural) agriculture and (urban) industry. In other words, here labour is not pulled by high service sector productivity growth, rather it is pushed by lagging dynamics in other sectors. During the 1990s a

reverse pattern can be observed for Brazil. Employment shifts out of services towards industry, indicating that labour is released from the low productive service sector as industrial activity picks up. In Sweden the negative employment growth in services during the 1990s must be interpreted as part of a general decline in total employment.

The most impressive employment performance in services can be seen in India. In contrast to its lagging industrial development, high employment and productivity growth in services show that the Indian service sector is a vital source for the creation of jobs. Undoubtedly this partly relates to the absorption of non-agricultural employment that cannot find its way into the formal (industrial) sector of the economy. However, there are also signs that the rise in internationally traded business services, such as the booming call-centre industry, has strong effects on the creation of new decent jobs in India. Cheap and abundant labour with a relatively high education level and English-speaking abilities appear to provide an important source of competitive advantage for India. Whether this development path will prove to be successful in achieving sustained growth in the long run remains yet to be seen.

In sum, increasing service sector employment can either indicate a successful transition of the economy towards higher productivity levels, or reflect a high inflow of workers in low productive industries, caused by the combination of demographic pressure and a disappointing productivity record in industry and services. The service sector comprehends very diverse activities from high productive and skill-intensive to low productive and low-skill activities, comprising also informal economy activities such as street vending, shoe shining and petty trading. Hence it is difficult to reach a uniform conclusion on the desirability of service sector expansion without focusing in some more detail on specific trends and structure of the service industries.

In present-day national accounts, a distinction may be made between four groups of services, i.e., producer services (financial and business services), distributive services (trade, transport and communication), personal services, and social services (including health, education and government) (Elfring 1988). Communal, social, personal and government services have increased most in size in the developed economies. The employment share of distribution and business services also expanded considerably. As welfare expanded and governments enlarged their grip on the economy the supply of social and government services particularly increased. This trend was slowly reversed since the 1980s, however.

Within the goods-related service sectors (producer and distributive services) major changes have taken place, as information and communication technology (ICT) have become an important source of productivity growth in industries, including financial and business services, distribution, transportation and communication. However, it is also an important source of productivity differences, as ICT is not being used to the same degree of intensity across countries. For example, the acceleration in productivity growth in U.S. services has, amongst other things, been ascribed to a successful implementation of ICT (Bosworth and Triplett 2002). In this respect, however, Europe clearly lags behind the U.S. (van Ark et al. 2002).

The role of ICT for employment and productivity growth

The rapid rise in production and use of in ICT (see also World Employment Report 2002) stresses the importance of technological innovation contributing to productivity growth of both manufacturing and service industries. Service sectors like distribution, transportation and communication have largely profited from increasing scale and capital-deepening which in many cases has been combined with an expansion in jobs. With the spread of ICT and the knowledge-economy capital-deepening in the service industry increasingly tends to take the form of accumulating intangible capital, knowledge and skilled or semi-skilled labour.

Now that ICT is generally viewed as the most important source of productivity improvements for the coming decades, a distinction between ICT-using and ICT-producing services and manufacturing industries has gained relevance. This distinction is used to determine whether the impact of ICT on economic growth fits the description of a general purpose technology (GPT). The impact of ICT is often compared with the impact of such other GPT's as electricity and steam. Much debate concerns the question of the long run effects of the ICT revolution to figure out the future growth potential ICT carries.

Table 4.3a: Productivity growth and GDP shares of ICT-producing, ICT-using and non-ICT industries in the EU and the U.S.

	GDP per person employed				Contribution to aggregate productivity growth				GDP share	
	1990-1995		1995-2000		1990-1995		1995-2000		2000	
	EU[b]	US	EU[b]	US	EU[b]	US	EU[b]	US	EU[b]	US
Total Economy	1.86	1.07	1.40	2.49	1.88	1.08	1.41	2.52	100.0	100.0
ICT Producing Industries	6.68	8.06	8.66	10.08	0.33	0.51	0.47	0.75	5.9	7.3
ICT Producing Manufacturing	11.13	15.10	13.76	23.72	0.17	0.40	0.22	0.68	1.6	2.6
ICT Producing Services	4.44	3.13	6.50	1.76	0.16	0.11	0.25	0.07	4.3	4.7
ICT Using Industries[a]	1.66	1.47	1.57	4.74	0.42	0.43	0.42	1.42	27.0	30.6
ICT Using Manufacturing	3.13	-0.26	2.13	1.15	0.20	-0.01	0.13	0.05	5.9	4.3
ICT Using Services	1.07	1.91	1.39	5.39	0.23	0.45	0.29	1.37	21.1	26.3
Non-ICT Industries	1.61	0.24	0.72	0.49	1.10	0.23	0.48	0.36	67.1	62.1
Non-ICT Manufacturing	3.84	3.00	1.49	1.36	0.51	0.31	0.18	0.13	11.9	9.3
Non-ICT Services	0.57	-0.35	0.18	0.43	0.25	-0.15	0.08	0.18	44.7	43.0
Non-ICT Other	2.72	0.70	1.92	0.58	0.34	0.07	0.21	0.05	10.5	9.8

In Table 4.3 the productivity and employment growth rates of ICT-producing and ICT-using industries in manufacturing and services are shown.[33] The earlier observation of the successful combination of employment and productivity growth in services in the US is largely confirmed. The negative employment effects of productivity growth in Europe have been considerably stronger than in the U.S. during the early 1990s. The initially negative employment effects in the ICT producing and ICT using industries, however, have turned positive during the second half of the 1990s.

[33] See appendix 3 for industry grouping.

Table 4.3b Employment growth and employment shares of ICT-producing, ICT-using and non-ICT industries in the EU and the U.S.

	Persons employed				Contribution to aggregate employment growth				Employment share	
	1990-1995		1995-2000		1990-1995		1995-2000		2000	
	EU[b]	US	EU[b]	US	EU[b]	US	EU[b]	US	EU[b]	US
Total Economy	-0.6	1.1	1.2	2.0	-0.60	1.11	1.22	1.98	100.0	100.0
ICT Producing Industries	-1.7	0.6	2.8	4.9	-0.06	0.02	0.11	0.23	3.9	4.9
ICT Producing Manufacturing	-4.5	-1.6	0.4	1.5	-0.06	-0.03	0.01	0.03	1.2	1.6
ICT Producing Services	0.0	2.2	3.9	6.9	0.00	0.05	0.10	0.20	2.7	3.3
ICT Using Industries[a]	-0.7	0.3	1.3	1.6	-0.20	0.09	0.35	0.46	27.3	28.7
ICT Using Manufacturing	-3.8	-1.6	-0.6	-0.8	-0.27	-0.09	-0.04	-0.04	6.1	4.2
ICT Using Services	0.3	0.7	1.9	2.0	0.07	0.18	0.39	0.49	21.2	24.5
Non-ICT Industries	-0.5	1.5	1.1	2.0	-0.33	1.00	0.76	1.30	68.8	66.4
Non-ICT Manufacturing	-2.8	0.3	0.1	0.0	-0.34	0.02	0.01	0.00	11.1	6.8
Non-ICT Services	1.0	1.9	1.9	2.1	0.41	0.96	0.87	1.08	45.8	50.5
Non-ICT Other	-2.9	0.3	-0.9	2.5	-0.40	0.02	-0.12	0.22	11.9	9.1

Note: see appendix 3 for distribution of industries.

a) excluding ICT producing industries

b) EU includes Austria, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, Sweden and the United Kingdom, which represents over 90% of EU GDP and 85% of EU Employment.

Source: Van Ark et al. (2003)

On balance the ICT using industries in the US and EU have a slightly better record in both employment and productivity growth than "non ICT" industries. Within the ICT using industries services have clearly outperformed the manufacturing industries. The EU countries still lean more towards the "traditional" industries. The productivity growth records for the ICT industries are much better in the US, whereas the non-ICT growth performance in Europe is slightly more favourable (Bosworth and Triplett 2002).

In sum we can conclude that technological advances, such as ICT, impacts on structural change in a favourable way, by generating both productivity growth and new employment opportunities simultaneously. The U.S. has clearly moved further into the direction of the technology frontier than the EU countries and it did not pay a price in terms of employment. Meanwhile the employment-productivity trade-off continues in the traditional non-ICT sectors either by comparatively low productivity growth or declining employment levels.

4.4 The role of the informal economy in structural change

In the process of structural change outlined above we mainly focused on resources shifting from low productive to high productive sectors. We have argued that a successful transition from an agrarian based economy towards an industrialised economy also requires substantial progress in the traditional agricultural sector itself. Especially in the case of developing economies, however, the process of

structural change can lead to a dual economic structure in which traditional low-productive sectors persist next to modern high productive sectors in the urban centers (Lewis 1955; Fei and Ranis 1987).

In economies undergoing rapid growth a lack of spatial and sectoral integration can often hamper the sustainability of economic growth and create barriers to social mobility and poverty alleviation. Dualism is almost symbolically reflected by the existence of a large informal economy, that is fuelled by a surplus of labour – often migrated from rural areas to the urban centers – left unabsorbed by the formal sector.[34] In some countries this part of the economy comprises over 50% of the total economically active population.

In this section we will deal with the specific role of the informal economy in the process of structural change. The crucial question is whether the informal economy can positively contribute to the dynamics of structural change. Here we argue the conditions under which this may be the case. In chapter 5 we will deal with the necessary -mainly institutional- conditions that facilitate the realisation of the informal economy potential.

Development and characteristics of the informal economy

In Chapter 2 we argued that the extent of structural change critically depends on the degree of growth potential and the conditions that contribute to its realisation. A high level of social capabilities (i.e. accumulated human capital and growth promoting institutions) critically contributes to the potential to reap the fruits of technological and organisational innovations. Underdeveloped social capabilities can lead to situations in which some aspects of modernisation are easily implemented whereas other aspects become an important drag on comprehensive social and economic development.

Structural change must allow for the fact that for fundamental changes to take effect, a certain period of time is required. Building an effective system of education, reforming rigid and deep-rooted institutions concerning, for example, the property rights structure or changing forms of more informal traditional or cultural behaviour are time-consuming processes, and demand commitments that often go beyond the typical political (election) cycle of four or five years.

[34] According to the resolution concerning statistics of employment in the informal economy, adopted by the Fifteenth International Conference of Labour Statisticians (ICLS), it consists of small scale production units that operate at a low level of organisation with little or no division between labour and capital. Labour relations - where they exist - are based mostly on casual employment, kinship or personal and social relations rather than contractual arrangements with formal guarantees. Moreover, these units possess the characteristics of "household enterprises": a) fixed and other assets do not belong to the unit but to the owner; b) units cannot engage in transactions or enter into contracts nor incur liabilities on their own behalf; c) expenditure for production and capital goods are often indistinguishable from household purposes. The ILO/ICFTU international symposium on the informal sector (1999) proposed a categorisation of the informal economy workforce into three broad groups: (a) owner-employers of micro enterprises, which employ a few paid workers, with or without apprentices; (b) own-account workers, who own and operate one-person business, who work alone or with the help of unpaid workers, generally family members and apprentices; and (c) dependent workers, paid or unpaid, including wage workers in micro enterprises, unpaid family workers, apprentices, contract labour, homeworkers and paid domestic workers.
(www.ilo.org/public/english/employment/skills/informal/who.htm)

The time lag for structural change to impact on growth, in combination with the effects of the demographic transition has resulted in an explosive growth of metropoles such as Mexico City, Jakarta, Calcutta and Lagos. These economies are confronted with large labour surpluses of underemployed people in the informal economy. Developing economies have only partly been able to absorb these surpluses by creating new employment opportunities.

The basic function of the informal economy is that it provides cheap alternatives to products and services from the formal economy, because informal economy workers and entrepreneurs accept a lower rate of return and make less costs for reducing several types of risk and insecurity. Furthermore informal economy competition is tough which keeps prices down (Lejour 1998). Another important rationale for the existence of an informal economy is that there is a substantial demand for informal econmy products and services, although it is easy to see that these two conditions reinforce each other.

The burden of turning informal activities into formal activities lies in the costs of becoming formal and is often frustrated by lack of proper institutions. The formalisation of businesses often requires the entrepreneur to accept and apply regulations concerning, among other things, the organisation of the production process, the hiring and firing of labour, minimum wages, business administration, insurance and responsibility. The implementation of these legislative prescriptions incur large costs. For the informal entrepreneur this investment is either an absolute constraint, or his/her cost-benefit analysis turns out to be negative.

The capabilities of the entrepreneur also often do not live up to the legal requirements to execute a formal job and become, for example, a registered haircutter, cook or carpenter in the formal sector of the economy. In addition, having a good and extensive network is in many countries at least as important as objective personal capacities to gain access to the formal sector. Hence the costs of becoming a formal economy enterprise are often higher than the expected benefits (de Soto 2000).

A rather specific type of informal sector employment concerns illegal economic activities. Apart from harsh criminal activities in drugs or weapon trade, a more common illegal activity is for instance the production of brand-copied wearing apparel. As illegal activities generate relatively high returns, they create incentives to bear the higher risk of getting caught. For people who live at subsistence level with hardly any perspective, these jobs are appealing.

The lack of decent work in the informal economy is reflected by a low standard of living, large insecurity, limited economic perspectives and low social mobility. As informal businesses are missing access to the capital market it is hard to release their constraints. Legal permits are costly and in addition, they are sequential. To get legal permits requires other permits and so on. The same applies for the certificates required. Education requires an investment which often depends on access to the capital market in the first place. Hence the self-perpetuating forces underlying informal economy employment are quite strong.

With respect to the productivity employment trade-off the informal economy characteristics are typically biased towards employment growth at the expense of productivity growth. The informal

economy is heavily biased towards unskilled labour. Nevertheless the role of small scale enterprises (SSE's) is increasingly considered to be potentially growth-promoting. Informal small scale enterprises provide a substantial source of employment and an important source of income as these enterprises are easy to start up and cater widely for the employment of unskilled labour. Furthermore, it is a source of capital formation for small entrepreneurs. Facilitating small-scale entrepreneurship by reducing entrance costs for informal sector workers can be considered as a labour-biased development strategy that can offset the distortionary tendencies (underemployment) of capital biased technological change (Little, Mazumdar and Page 1987, Vandenberg 2003).

The expansion of the informal economy[35]

Only recently labour statisticians have begun to capture the informal economy in quantitative terms. Still there are major problems in defining informal economy employment and statistics often lack comparability. Nevertheless the ILO has published some preliminary results and estimates, including a percentage share of employment in the urban informal economy in total urban employment (Table 4.4).

Self-employed workers, most of whom are own-account and unpaid family workers, make up the major part of the rural and urban employment. In many developing countries the number of self-employed in non-agricultural activities also increased. During the 1990s, own-account and family workers represented nearly two-thirds of the total non-agricultural labour force in Africa, half in South Asia, one-third in the Middle East, and one-fourth in East Asia and Latin America. A dramatic increase in self-employment has also marked the transition process in former centrally planned countries of Europe. In the 1990s own-account workers made up one-fourth of total employment in Poland, one-fifth in Romania and one-tenth in the Czech Republic, Hungary and Slovenia.

In Latin America the urban informal sector was the primary job generator during the 1990s. On average 60% of the new jobs were created by micro-enterprises, own-account workers and domestic services. Informal economy employment increased by a yearly 3.9%, while formal economy employment grew by only 2.1%. In Africa, urban informal employment was estimated to absorb 61% of the urban labour force and to generate more than 93% of all additional jobs in the region in the 1990s. In Asia it was estimated that the informal sector typically absorbed between 40 and 50% of the urban labour force (before the 1997 financial crises), displaying large differences between the newly industrialising countries (less than 10%) and countries such as Bangladesh, Nepal and Pakistan (over 60%).

Table 4.4: Percentage of total employed in the urban informal sector

		Total	Male	Female
Benin	1999**	46	50	41
Ethiopia	1999*	50.6	38.9	64.8

[35] Large parts of this section are directly drawn from the ILO website: www.ilo.org/public/english/employment/skills/informal/who.htm. Apart from table 4.5, all other figures mentioned are taken from *ILO Key Indicators of the Labour Market* (KILM) *1999*; *ILO Panorama Laboral 99* and *ILO, World Labour Report 1997-98*; statistics compiled by Jacques Charmes for POLDEV, 1998.

South Africa	1999**	21.3	16.1	28.4
Tanzania	1995**	67	59.7	85.3
Brazil	1997**	27.3	27.4	27.1
Mexico	1999**	29.7	30.8	28
Peru	1999*	53.8	48.9	60.6
India	2000**	51.3	53.7	40.6
Philippines	1995**	17.3	15.8	19.4
Nepal	1999**	64.8	60.0	75.7
Pakistan	1997**	61.2		
Turkey	2000*	10.2	10.4	9.4
Russian federation	1999*	4.5	4.4	4.7
Georgia	1999**	14.2	20.7	7.4
Lithuania	2000**	41.3	49.6	26.5
Ukraine	1997**	4.9	4.5	5.3

* according to harmonised definition of the ILO; ** according to the national definition

Source: ILO Compendium of official statistics on employment in the informal sector, STAT Working paper, pp. 16-28

The share of women in the informal eoconomy is relatively high at between 60 to 80% of total informal sector employment. Women comprise most of unpaid family helpers and home-based workers. The recent widespread strategy of firms in the formal sector in advanced and developing countries to subcontract production and services to family enterprises and home-based labour has contributed to the linking of women's home-based labour to the formal production system under informal, flexible employment arrangements.[36]

A potential positive contribution to creating better jobs?

Given the imbalances in the process of structural change reflected by the expansion of employment in the informal economy in many developing countries, the challenging task ahead is to turn this large pool of human potential into a more productive one, with higher rewards that can generate incomes through which labour conditions and living standards can be improved.

It is therefore useful to distinguish between informal activities that play a role in the vertical chain of formal production (complementary activities) and those that are merely substituting for and thus competing with formal activities. Examples of the latter type are, for instance, street vending, food stalls, the production of low-quality apparel and shoes or simple mechanical work. They are sometimes perceived as a threat to formal economy counterparts, and there can be legal as well as

[36] Women tend to be concentrated in a narrower range of activities or occupations (typical activities are food processing, garment sewing, domestic services), in tasks that require less or no skills and pay less. Moreover, in addition to constraints faced by workers and producers in the informal sector with regards to access to assets, markets, services and regulatory frameworks, women face additional gender-specific barriers such as restrictions to entering into contracts, insecure land and property rights and household and childcare responsibilities.

illegal actions directed against these activities to depress their competitive pressure. On the other hand, activities that are considered to be complementary to formal production processes play a different role in the economy. One can think of informal transport services, the production of intermediary goods or informal types of education and learning, which are not at hand in the formal sector, that are required to smoothen the vertical chain. The lowering of entrance costs for these small scale enterprises, either in the formal or the informal economy, may create beneficial spillover effects to the formal economy.

Although the arguments above are still somewhat speculative, the importance of the informal economy in nurturing small entrepreneurship, job creation and market integration deserves attention. Once small informal businesses are enabled to develop, by gaining access to important facilities such as capital loans, market information, simple technology and sufficient protection of property rights, the urban informal economy can even create a modest surplus that can in turn be used to develop business linkages with the formal economy. Ultimately this will lead to a decline in inequality in income and wealth as it helps to create a sizeable middle class that stimulates social and political stability and enhances effective domestic demand.

Clearly a large informal sector is in itself not a sign of favourable economic development. On the contrary, it primarily points at the existence of a dual economy. But given the very existence of the informal sector, and the problems to match demand and supply of labour in the formal economy, there is no other option than to focus on its growth potential meanwhile fighting intolerable excesses in human deprivation and poverty. The challenge is to formalise informal economy employment by creating the right facilities. In the process of building commercial and financial institutions to enhance economic integration, SSEs can perform an important intermediate role. This strategy should focus on bringing down the costs of formalising business (De Soto 2000).

5. The Institutional and Policy Framework

5.1 Introduction

Despite large achievements in world economic growth over the past two centuries, which has brought increased welfare to the average population in an increasing number of countries, there have been winners and losers in the process. In the preceeding chapters we have aimed to find systematic patterns in terms of (groups of) countries and industries that either benefited or suffered from economic growth. In particular we focused on the question to what extent the long run achievements in productivity and per capita income growth have created circumstances of trade-off between productivity growth and job creation in the medium run.

Firstly, we found an increased diversity in productivity performance between developing and advanced countries over the past decades, but also greater diversity within the two groups of developing and advanced nations themselves. Secondly, we found that countries which have generated productivity growth on a sustainable basis (that is, in the long term and widespread across the economy) have been more successful in keeping labour force participation rates up (or even increased them) than countries that have undergone slow growth. Thirdly, we found that in the medium run trade-offs between productivity and employment growth frequently occur across sectors. However, industries that are most susceptible to technological and organisational innovations, despite the labour-saving bias of many of today's new technologies, are more likely to generate productivity growth together with the creation of more productive, higher skilled and better paid jobs, than industries that are not characterised as innovative. Finally, the trade-off in productivity and employment growth in developing countries is often worsened by the demographic transition and insufficient absorption capacity of the modern sector, for which the informal economy can play an important role as a (temporary) buffer for creating less productive jobs.

It should be clear from this assessment that during the process of structural change shifts in benefits from the fortunes of growth are unavoidable. Even in situations of very rapid growth (as, for example, in the East Asian countries during the 1960s and 1970s) when almost all groups and industries in the society benefit from growth in terms of higher incomes and faster productivity growth, there are those that benefit more than others. The question posed in this final chapter therefore is not how to avoid the trade-off between employment creation and productivity growth. Instead one should consider which policies contribute to creating an environment that tackles the social and economic disadvantages of trade-offs in the medium run without affecting the long run opportunities to realise the potential for productivity growth with job creation.

Following the framework outlined in Chapter 1, the description of the policy framework needs to focus on the institutional design governing the investment decisions concerning tangible and intangible capital, the decision-making concerning the demand and supply for labour, and the (re)allocations of these resources to industries and firms. These decisions are normally taken in an environment, governed by markets in which supply and demand for factor inputs (labour and capital markets) and product and services (product markets) are matched. Governments play an important role in setting the "rules of the game" (or institutions) for these markets.

Below we begin with a brief overview of theoretical perspectives on policies that enhance productivity growth and job creation. We then focus on two broad policy areas. These are the incentive structure, which depends on the regulation and functioning of markets, and the national innovation system, which relates to the network of actors that are involved in the creation of knowledge and human capital, technological change and organisational innovation. An effective national innovation system can be seen as crucial for the generating of social capabilities.

It should be said beforehand that there obviously are no universal policy prescriptions to be taken from the analysis below. Institutions are strongly path dependent and embedded in the social, cultural and historical roots of any society. In fact much of the recent institutional literature strongly emphasises the endogeneity of institutional change (North 1990; Aoki 2001). Hence there is no single institutional design that has been most effective in supporting change. In addition, throughout this report we stressed the importance as regards the stage of economic development a country finds itself in. For example, Rodrik (2003) argues that early stages of growth often require a limited number of reforms "that need not overly tax the institutional capacity of the economy", whereas in the long run the challenge is to construct "a sound institutional underpinning to maintain productivity dynamism and endow the economy with resilience to shocks over the longer term" (p. 3).

5.2 Theoretical Perspectives on Productivity-Enhancing and Employment-Creating policies[37]

In a market economy the main policy instruments available to promote and support faster growth are to encourage private enterprises to find new possibilities for doing (particular kinds of) business and create more employment opportunities by:

(1) direct modification of the costs and benefits of alternative investment decisions (e.g., through taxes, subsidies or legislation of different kinds), and/or
(2) changes to the institutions that condition private sector decision making, for instance, the extent of competition in different product markets; the levels and types of skill produced by national education and training systems; the levels and institutional forms of support for basic and strategic research; investment in transport infrastructure; legislation governing labour and financial markets, etc.

The most well established theoretical perspective relating to enterprise behaviour, and government policies attempting to influence that behaviour, derives from neo-classical theories of economic growth. The prototype enterprise in the neo-classical view is seen as profit maximising, making decisions about production, employment and investment in response to price signals in perfectly competitive markets where all risks relating to unknown future outcomes are internalised. From this perspective the argument in favour of policy interventions is to seek to correct different kinds of market failures, externalities, spillovers, etc., that inhibit an optimal allocation of resources. It is further argued that policies should be so designed as to minimise distortions to market signals, for example, that as far as possible they should be generally applicable in nature rather than intended to encourage particular kinds of economic activity (as would be the case with sector-specific or

[37] The following sections are largely based on Mason, O'Mahony and van Ark (2003) & van Ark (2003).

technology-specific policies). In practice many supporters of this view of the enterprise would not go as far as to advocate positive policy interventions to correct perceived failures on the grounds that the policy makers do not have sufficient information to correct these without inducing other distortions. On the other hand, neo-classical economists tend to be strongly in favour of negative interventions, i.e. those that remove government influence in the market place such as deregulation of product or labour markets.

Similar issues have arisen when studying the impact of more flexible labour markets, with less stringent hiring and firing rules, limited regulations concerning administrative permits, etc., on output and employment creation. In principle, flexible labour markets support the (re-)allocation of labourers from less to more productive industries, in particular when the wage structure (at least to some extent) reflects differences in productivity performance across the economy. But the outcomes clearly differ across countries depending on the nature of that country's wage bargaining and training institutions, its pattern of industrial specialisation and the types of market structure that predominate (OECD 2003).

A different focus on employment and productivity-enhancing policies has come from evolutionary theories of economic growth in which enterprises are seen as profit seeking (rather than profit maximising) and operating in conditions of unquantifiable uncertainty rather than quantifiable risk (Nelson and Winter 1982). From this perspective the central aim of policy is not so much (or not just) to remove market imperfections, but rather to provide conditions that support inventions and innovations. There is increasing agreement that this needs to be done, not just by encouraging the production of new economic knowledge, but also by taking steps to facilitate and speed up the distribution of knowledge within national economies (David and Foray 1995). This approach provides a rationale for public policies and programmes intended to influence the behaviour of enterprises in terms of, for example, external knowledge search and exchange, international co-operation and R&D collaboration with universities, research institutes and other enterprises (see, for example, Dosi et al. 1988; OECD 1999).

In the light of these different perspectives on enterprise behaviour and public policy interventions, the remainder of this chapter considers both actions that governments can take to improve the operations of markets *and* actions which in principle may help to strengthen innovation processes and speed up technological change. Thus, mindful of the scope for wastage of public resources in efforts to directly influence enterprise behaviour, the main emphasis will be on evaluating changes in public policies which help shape the social-institutional context for private sector decision-making and support the creation of social capabilities. Examples relate to education and training, infrastructure of different kinds and institutional arrangements concerning basic scientific research and technology diffusion and utilisation.

5.3 The Impact of Markets on Productivity and Employment Creation

The regulatory environment in which firms operate is likely to impact on their ability to instigate productivity improvements and generate more employment, either through a better allocation of

inputs, more technology transfer or a greater ability to generate spillovers. In many studies a distinction is made between product and labour market regulations. Economic theory suggests that, all else being equal, a greater degree of product market competition creates greater opportunities for comparing performance and increases incentives to search for and implement cost-reducing investments in new technology and changes in work organisation (Nickell 1996; Nickell *et al.* 1997). Similar expectations about incentives apply to firms operating in a context of relatively low costs in terms of adjusting labour quantities and qualities in ways that harmonise with the adoption of new technologies and new modes of work organisation.

In the past many existing institutional settings or regulatory arrangements have originally been set up with the motivation to smooth the functioning of the markets, by streamlining rules on competition, business conduct, labour markets, consumer protection, public safety, health and so on. However, regulations may also become a drag to the extent that they limit the efficiency of market functioning, reduce entry of new firms and delay exits.

There has been an increasing awareness of the need for an innovation-specific focus on (de)regulation and its impact on growth and productivity performance in the knowledge economy. For example, in the context of ICT diffusion, McGuckin and van Ark (2001) have argued that too tight regulations may hamper the spread of ICT in European countries compared to its widespread use in the United States, where regulatory reforms started much earlier and were pursued more vigorously than in Europe. Indeed the opportunities to exploit new technologies are to a large extent determined by the regulatory environment. Most notable examples of industries that have witnessed large-scale regulatory changes are the former publicly regulated sectors, such as telecommunications and electricity production and distribution. But market-oriented industries have also been deregulated, for example in transportation, retail trade and the financial sector.[38]

Although there is substantive evidence of a strong relation between the diffusion of new technology, such as ICT, and regulation, no such relation can be found between productivity growth acceleration and the regulatory arrangements on product and labour markets (see, for example, van Ark 2003). In fact a direct linear relationship between productivity and regulation at the macroeconomic should not necessarily be expected. A better case can be made for a quadratic or U-shaped relationship, which would suggest some optimal midway point for the relationship between regulation and total factor productivity (TFP) growth.

Also in the area of employment protection legislation (EPL) the relation to productivity is not always straightforward, and is often dependent on other institutional factors, such as the wage bargaining system of a country, and the macroeconomic context within which wages are set. For example, a recent OECD study shows that strict EPL has a relatively small impact on productivity and R&D intensity in countries such as Germany and Austria with centralised wage bargaining procedures and well-established apprenticeship and continuing training systems which provide support for firms to

[38] For example, Hubbard (2003) studies the use of ICT and regulatory reforms in US trucking. Regulations in trucking and retail trade in OECD countries have been assessed by Boylaud (2000). OECD (2003) reviews the relation between regulation, innovation and productivity growth.

upgrade the skills of their existing employees in response to technological change (OECD 2003). Conversely, the negative effects of EPL on productivity may be strongest in countries such as Belgium, France or Portugal 'where the adjustment costs associated to EPL are not offset by the possibility of adjusting wages or use of internal training' (OECD 2003, p.112).

In fact, in order to evaluate the effects of strict employment protection legislation (EPL) on productivity and employment growth, a wider view of predominant labour market institutions in a given country needs to be taken than just to focus on the flexibility of the labour market. For example, in many countries (large) enterprises still operate internal labour markets which are characterised by a longstanding preference for external recruitment to be confined to a range of entry-level jobs and for the bulk of more senior positions to be filled through internal promotion. Common rationales for employers to maintain internal labour markets centre on the benefits to employee motivation, the cost savings from lower labour turnover and firms' efforts to maximise returns from job-specific and company-specific training. If such effects can be reached, in particular in unstable institutional environments, the negative effects of strict EPL on productivity will be reduced.[39]

Another important matter is that the relation between regulation and productivity is likely to be highly sector specific. For example, at industry level strict employment protection legislation is likely to have strong negative effects on productivity in low-technology industries if employers are restricted in their capacity to shed labour following the introduction of labour-saving technologies. Strict EPL is also likely to depress productivity growth and R&D intensity in high technology industries with relatively low levels of market concentration where technologies tend to evolve and/or be replaced very quickly. By contrast, the negative impact of strict EPL on R&D intensity is likely to be less in high- or medium- technology industries with relatively high levels of market concentration. OECD (2003) cites the examples of electronic components and aircraft as industries of this kind which are characterised by cumulative innovation processes rather than rapidly changing technologies, and thus stand to benefit from progressive development of existing employees' skills. An analysis of industry specific regulations for the OECD suggests that in the airline industry, countries with a less regulatory environment have higher output and employment growth, but the effect on productivity growth is ambiguous. In the retail sector, in contrast, less regulations have raised output growth but not employment growth, hence suggesting a positive impact on productivity growth (Broersma and van Ark, 2004).[40]

In summary, under the influence of structural reforms the relation between productivity and employment can go both ways. As stressed above, inadequate institutions can lead to a misallocation of resources even under a regime of free markets. Moreover, structural reforms may differ in terms of the timing gap between implementation and the resulting impact on productivity and employment. For example, reforms in retailing can initially lead to longer opening hours of shops, thus requiring more labour without creating much more throughput. Only once the consumer has changed his behaviour in response to the new opportunities, will retail output increase and the quality of retail services improve.

[39] See, for example, Wachter and Wright (1990) and Eyraud, Marsden and Silvestre (1990).

[40] See also Nicoletti and Scarpetta (2003).

Indeed the rise of a middle class in emerging economies is a driving force behind changes in demand patterns with a positive impact on productivity performance in the longer run.

5.4 Technology, Innovation and Human Capital Policies

Governments also need to create the "rules of the game" concerning technology creation and diffusion and the formation of human capital. Although technology creation is of particular importance for moving the productivity frontier and improving best practices, technology diffusion particularly contributes to reducing the productivity gap between average and best practice firms, including best practice abroad. Policies which are focused on the former are therefore more likely to focus on the support of R&D, a properly working patent system and the training of graduates, in particular in sciences. The latter is oriented towards facilitating knowledge flows, by supporting national and international co-operation between firms, and between the business sector and public and private knowledge institutes, as well as the support of in particular intermediate skills and vocational training.

However, in practice, policies towards technology creation and diffusion cannot (and perhaps, should not) be so easily disentangled. For example, it might be argued that small/medium size economies, like many developing nations but also smaller countries in Europe, can benefit to a larger extent from international knowledge spillovers and therefore need less domestic R&D than larger economies. But others have argued that even in smaller countries more domestic R&D will facilitate the adoption of foreign technologies (Jacobs, Nahuis and Tang 2002). In addition, it may be argued that knowledge intensive industries are strongly tied to local knowledge networks, and that absorptive capacity and complementary investments in physical and intangible capital are always important (Kleinknecht and ter Wengel 1998; Fagerberg and Verspagen 2000).

Indeed from the perspective of social capabilities, an increase in absorptive capacity refers to both technology creation and diffusion. It strengthens the ability to assimilate new knowledge and successfully apply it to the commercial production of product or services, which is therefore in itself an important driver of technology diffusion. Absorptive capacity strongly relates to the level and growth of intangible assets created by firms and the society as a whole, including human capital creation and organisational changes.

During the 1980s and 1990s, the interest in the role of investments in human capital and research and development and its impact on knowledge creation and economic growth has strongly increased (Romer 1990, 1994; Lucas 1988). Due to the public good characteristics of knowledge creation, enterprises are unable to appropriate all the external benefits of their investments and therefore private rates of investment in research and innovation will be lower than would be socially optimal. In principle, this is another form of market failure that provides a rationale for government policies designed to encourage higher levels of private investment in knowledge production. Later versions of endogenous growth models concentrated more on the dynamic process linking innovation and growth within a Schumpeterian framework of creative destruction (Aghion and Howitt 1998, Aghion et al. 2001). In recent years, there has also been increased attention for the complementarity of investment in high-tech inputs (such as ICT) and organisational changes. These can be defined as changes in the

strategies, structures and practices of organisations, and may involve a number of elements including changes in organisational structure, in the work process or new forms of work organisation, innovative human resource practices, new industrial relations practices, new business practices and new management techniques (European Commission 2003, p. 58). These studies generally confirm strong joint effects of technology use (such as investment in ICT capital) and skill creation, which supports the hypothesis of skill-biased technological change (Berman et al. 1998; Autor et al. 1998). Clearly, investment in organisational changes are largely at the discretion of individual firms rather than the government, but the latter can again play a crucial role in creating the appropriate external conditions for making such investments worthwhile.

Many of the actors that play a role in strengthening the innovation and knowledge base can be brought together in the framework of a national innovation system (NIS), which consists of actors and institutions, including the business sectors, the government, the education system, universities and research organisations, the financial system and the labour market.[41] Within the NIS, linkages among the actors are very important, just as incentives given to firms to undertake innovative activities. From a policy viewpoint, the advantage of the NIS approach is that it recognizes the systemic nature of the process of technological change and its links with the economic, cultural and social environment. In line with the evolutionary approach to economic growth, the NIS approach also allows to address "system" failures, which depend on external factors, rather than only market failures to innovation. Such system failures may include incentive conflicts between various agents, weaknesses and asymmetries in some parts of the innovation system that do not match with other parts of the system (Gu 1999). This approach therefore requires a greater degree of co-ordination to support innovation that goes beyond the removal of market failures. At the same time it must also recognize the uncertainties on the outcome of policy interventions in the innovation process.

Although the NIS literature originates from advanced countries, much of it may be especially relevant for developing countries, where market failures and imperfect or missing markets may play a greater role in hampering the innovation process. Some of the development economics literature has stress the importance of technological capabilities for growth, but the link of the NIS approach to policy making is still largely missing. One of the specific problems in extending the NIS approach to developing countries is the need to recognize the phase of the transition process in which a particular country finds itself, as this determines the contours of the NIS. This requires a good knowledge of the historical development, social, economic and political aspects of the network of institutions related to the innovation process. Gu (1999, pp. 43-48) provides a useful summary of the key notions concerning the innovation process in a developing country:

1) Industrialisation requires fundamental transition of the traditional technological and institutional attributes to become innovative and dynamic;
2) National innovation systems are specific to the development phase of a country and specific characteristics of the country;
3) Extraordinary "enhanced learning" is the key for a successful catching up which requires and is supported by a rapid development of a development country;
4) The role of the market in promoting learning and generating change needs to receive special attention;

[41] See, for example, Lundvall (1988) and Freeman (1995).

5) For developing countries, learning to innovate is more closely related to capital investment than in advanced countries.

There is some useful literature on the role of national innovation system in developing countries, in particular in East Asian countries. The emphasis in this literature on the role of learning is very striking, and so are the different mechanisms through which (foreign) knowledge is obtained. For example, in terms of knowledge inflows, licensing, industrial targeting and the innovation role of large firms have been the main instruments in Korea, while FDI was the key catalyst to support learning in Taiwan (Kim 1997; Mowery 1998; Gu 1999).

However, national innovation systems approaches often still have a rather exclusive focus on the production of goods. Although such a focus may be relevant for many industrialising countries, national innovation systems in advanced countries should be more focused on services. In advanced countries, the latter is the key sector for employment generation, and the potential for productivity growth in these sectors has been insufficiently realised. In a recent study, den Hertog et al. (2003) review the evidence on the importance of innovations in services, including organisational innovations and changes in firm strategies and marketing. They suggest to support innovation in services and service functions in advanced countries in a number of ways. Firstly, existing innovation policies, such as R&D policies and extension services by government, can be deepened by making them more services-friendly through focusing on aspects of non-technological innovation. Secondly, policies can be broadened by extending technology diffusion programmes to service firms and by supporting management programmes that can promote an "innovation culture" in service industries. There is also a need for promoting links between service firms and public and private research organisations in the areas of non-technological innovations.

However, not just the distinction between goods and services is a relevant aspect in considering the use of the NIS approach in advanced and developing countries. The type of innovation process itself is also relevant. For example, Edquist et al. (2001, p. 124) argue that industries (both manufacturing and services) in which there is emphasis on process innovation tend to be more strongly characterised by labour-saving technological change than is true for sectors which have high levels of product innovation. Hence a negative impact of innovation on employment creation tends to be more strongly negative in the former group of industries than in the latter.

Finally, "horizontal policies", which are policies not directly related to innovation, are at least as important to improve innovation activity across the economy. As human capital is a key input in the innovation process, there is a clear role for the government to provide an adequate formal education system, to support training and mobility of researchers and facilitate co-operation. The impact of education on growth and innovation has been a major topic of debate in the literature, and this direct relation has been disputed.[42] However, there is considerable evidence that education strengthens social capabilities and increases the adaptive capacity to adjust to new technologies. Hence education will certainly indirectly contributes to growth.

[42] See Temple (2001) for a review.

As mentioned above, the design of policies intended to speed up the rate of technological change typically require a strong element of judgement, regardless of whether the policies are sector-specific or horizontal in nature, and therefore there is considerable scope for government error in formulating and implementing such policies, just as there is in efforts to correct market imperfections. Hence there is widespread agreement about the need for caution in efforts to improve productivity and growth through public policy interventions. Indeed, many evolutionary economists caution against any hint of policy makers returning to previous efforts to 'pick winners', rather the aim should be to 'encourage winners to emerge by strengthening the innovation process in general' (Metcalfe and Georghiou 1998). To be able to create such an environment, Rodrik (2003) argues that many of the "first-order economic principles" in neo-classical economic analysis, such as protection of property rights, contract enforcement, market-based competition, appropriate incentives, sound money and debt sustainability, remain the most useful tools for this. The point is that such functions of good institutions do not map into the form that the institutions take. According to Rodrik … "reformers have substantial room for creatively packaging these principles into institutional designs that are sensitive to local constraints and take advantages of local opportunities" (ibid, p. 3).

In conclusion, the role of institutions and policies to create the virtuous cycle of productivity and employment, growth which has been the key theme of this report, should neither be overstated nor understated. On the one hand historical circumstances, local constraints and opportunities, changes in the nature of technological progress, and the mobility of labour and capital in the world economy are factors that are largely beyond the reach of policy makers. On the other hand, the willingness to embark on a process of economic modernisation that is aimed at creating an environment that is receptive to institutional changes that support structural reforms and innovation provides the key to realise the potential for productivity growth and the creation of decent jobs.

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Appendix 1: Concepts of productivity, labour input and labour force participation

The key performance concepts used in this study are labour productivity growth and levels, labour input growth and labour force participation. The measures are largely derived from the KILM database, especially from Chapter 18 on productivity and unit labour costs.

Labour productivity is a typical single factor productivity measure, which relates a measure of output to a single measure of input, labour. It is the most widely used measure of productivity, and is mostly measured in terms of value added over employment or value added over total working hours. Labour productivity measures have their own specific uses, for example, as a measure to identify the contribution of productivity – next to labour force participation – to the improvement in average per capita income, which makes it a particularly useful for the purpose of this study.[43]

Labour productivity can be expressed in different ways both on the output as well as on the input side. On the output side, a distinction can be made between productivity measures that relate gross output to one or several inputs and those that use value added to capture movements in output. At the macroeconomic or sector level, which is applied here, value added measures are more widely available, and – without information on intermediate inputs – most desirable as they avoid double counting of output when aggregating the results across sectors. On the input side, a distinction can be made in terms of output per person employed or per hour worked. Internationally consistent measures of hours worked are much harder to come by than measures of employment, in particular when developing countries are included (see ILO, 2003, Chapter 18). But even comparisons of output per person employed can be affected by differences in treatment of self-employed workers, workers in the informal sector, unpaid family workers, etc. The latter issues concerning employment estimates have also an impact on the comparability of measures of labour force participation. The precise definitions are provided in Appendix 2.

The most obvious and comprehensive source for productivity measurement at the level of the total economy or for individual sectors is the national accounts. National accounts are based on international conventions concerning measurement of output and inputs laid down in the UN System of National Accounts (SNA, of which the latest version refers to 1993) and – for Europe – the European System of Accounts (ESA, of which the latest version refers to 1995). Unfortunately, the practical implementation of SNA conventions in the national accounts statistics is not quite the same across countries. In particular many developing countries have not yet adopted the new SNA. At the aggregate level of total GDP the impact of such differences is usually fairly small, but it may be bigger for output measures at the sector level.

Data on labour input mostly needs to be derived from other sources than from the national accounts. Although the SNA 1993 and ESA 1995 recommend the measurement of employment and hours

[43] An important alternative measure is total factor productivity, relating a measure of output to a bundle of inputs). Total factor productivity measurement is a better way to distinguish between contributions to GDP from efficiency improvement and contributions from inputs, such as labour, capital and intermediate inputs. See, for example, van Ark (2003)

worked within the framework of the national accounts, such measures are not as well standardised as for employment estimates from labour force survey or enterprise statistics. Labour input measures from the labour force survey are usually most consistent across countries, and have the advantage that they can be combined with measures of unemployed in the labour force and population in different age categories.

The measurement of working hours represents a particular problem for international productivity comparisons. If available, one may use information on working hours from labour force statistics, but a good alternative is to use a "composition method" for the estimation of actual working hours. This implies a combination of enterprise-based statistics for measurement of hours of paid employees in the business sectors, and labour force statistics for the measurement of hours of self-employed workers, government employees, and working time lost due to vacation, sickness, etc. Although differences in measurement of working hours probably have less impact on comparisons of productivity growth than on relative productivity levels, even in the former case it can matter substantially.

Information on labour quality, for example, on the skill composition of the labour composition, always needs to be derived from sources other than national accounts, in particular the labour force survey. Due to comparability issues, it is usually not possible to make international comparisons for more than three skill categories, and much of this work will remain limited to OECD countries. For example, on the basis of the Eurostat Labour Force Survey, one can make a distinction between low skills (pre-primary, primary and lower secondary education), medium skills (upper secondary education) and high skills (total tertiary education). It should be noted, however, that Eurostat does not attempt to harmonise the skill divisions across countries, taking data delivered by the member countries as given. There are also problems with classifying vocational training between the categories. Each country may experience different levels of vocational training and also, when classifying these workers to skill groups, may deal differently with them.

Measures of productivity levels for this study are also obtained from KILM 18. Such measures are of great interest for a wide range of purposes. For example, they indicate the gaps countries face compared with the productivity leaders at aggregate or at industry level, and hence inform policy makers about the potential for catch-up and convergence (Abramovitz, 1986). Productivity level measurement may also inform the debate on policy reforms that may be needed to enhance productivity performance.

Many of the issues on measurement of relative productivity are not all that different from those described above for productivity growth measurement. However, the sensitivity for measurement issues concerning GDP, labour and capital input is considerably larger for level estimates than for growth estimates. For example, nominal GDP levels are strongly affected by issues concerning the measurement of capital formation, military production, the treatment of financial intermediate services and adjustment for non-observed parts of the economy.

An important additional issue is that comparisons of productivity levels across countries require the conversion of output and factor inputs, expressed at their own national prices denominated in national

currencies, into values at common prices denominated in a common currency. For aggregate comparisons of productivity levels, currency conversion factors for value added are usually obtained from expenditure-based purchasing power parities (PPPs).

This study also makes use of measures of output and labour input by industry (Chapter 4). In practice, the quality of measures of output and productivity differs highly across industries and between countries. Griliches (1994) showed a striking difference between the acceleration of labour productivity growth in 'measurable' sectors of the U.S. economy (agriculture, mining, manufacturing, transport and communication, and public utilities) and the slowdown in 'unmeasurable' sectors (like construction, trade, the financial sector, 'other' market services and government) over past decades. Apart from this rise in measurement error at the aggregate level due to a shift towards the unmeasurable sectors of the economy, one may also observe an increase in measurement problems in the 'unmeasurable' sector itself. This component of the rise in measurement problems may – at least in part – be related to the increased use of ICT.

One way to summarise measurement problems at industry level is by distinguishing between measurement problems with regard to output in manufacturing (which is the major industry of the 'measurable' sector of the economy) and output in services (which dominate the 'unmeasurable' sector) vis-à-vis measurement problems concerning the inputs (production factors and intermediate inputs) in manufacturing and services. This approach shows that the measurement problems tend to be largest at the level of output measurement in services.

However, it should be stressed that major advances in measurement of macroeconomic statistics have been made in recent years. Many statistical agencies have undertaken activities to improve measurement of output and inputs. Furthermore, the System of National Accounts 1993 (SNA 1993) and the European System of Accounts (ESA 1995) do allow for the development of satellite accounts which may include knowledge accounts and social accounting matrices (such as SESAME) that link knowledge with demand. These developments provide important new avenues for the analysis of productivity. Indeed there is certainly no reason for "measurement nihilism" as if the data do not tell us anything, in particular not when we take into account reasonable margins of uncertainty.

Appendix 2: Labour Force Categories in the Process of Economic Modernisation

The subdivision of the labour force[44] in the ILO statistics can be used to describe the changes that have occurred in the world of work during the past two centuries:

1) Paid employees. Employees who receive a salary or a wage. This is the group of people working in the typically modern production organisation of wage employment, either in small, medium or large scale businesses or in the greatly extended government sectors of education, health care or administration.
2) Own-account workers. This is the most diverse employment group. Firstly, a large part consists of farmers exploiting their own farm business. The share of this group in total employment is declining rapidly during the process of economic growth, and after a certain point the number of farmers also declines in absolute terms. Secondly, a large part is made up of other self-employed persons in industry and services. In particular in developing countries, these jobs are often in the sphere of the urban informal economy which are generally low-productivity activities in small scale handicraft industry, retail trade and personal services. On the other hand, economic growth leads to a new category of small enterpreneurs in some parts of the economy, for example in business services. Apart from begin characterised by relatively high productivity levels, increased entry of this group of small enterpreneurs can be a potential source of strong productivity growth. Finally, the employers, by definition a much smaller but also very diverse group, are included here either as an entrepreneur in informal or formal sector business.
3) Unpaid family workers. These people contribute to a family business and obtain a share of family income instead of a formal wage. Unpaid family workers are mainly found in the agricultural sector and to a lesser extent in retail trade. The category of unpaid family workers is often dominated by women, who take care of a substantial part of family income in various ways in the family businesses, involved in farming, household manufacturing or the service industries of commerce, transport and tourism. One of the great problems of labour statisticians is to value and standardize the economic contribution of all the work that does not formally pass the labour market (see also the discussion on the female labour participation rate in Section 2.3).

[44] The labour force refers to the so-called economically active population and consists of all employed and unemployed people. Employed are those who are reported to have a job for at least one day a week (in a survey) for which they receive income. Unemployed are those who want work and search for work, but are not occupied yet. In this respect they are distinguished from the economically inactive population, mainly consisting of children, retired, women involved in housekeeping and childcare and disabled.

Appendix 3: Grouping of ICT producing, ICT using, and less intensive ICT-using Industries

ISIC Rev. 3	**ICT-producing industries**
	ICT-producing manufacturing
30	Office, accounting and computing machinery
313	Insulated wire and cable
321	Semiconductors and other electronic components
322	Communication and broadcasting equipment
323	Radio and TV receivers
331	Medical and measuring equipment and industrial process control
	ICT-producing services
64	Post and telecommunications
72	Computer and related services

ISIC Rev. 3	**ICT-using industries**
	ICT-using manufacturing
18	Wearing apparel, dressing and dying of fur
22	Printing and publishing
29	Machinery and equipment
31, excl. 313	Electrical machinery and apparatus, excluding insulated wire
33, excl. 331	Precision and optical instruments, excluding ICT instruments
351	Building and repairing of ships and boats
353	Aircraft and spacecraft
352+359	Railroad equipment and transport equipment
36-37	Miscellaneous manufacturing and recycling
	ICT-using services
51	Wholesale trade
52	Retail trade
65	Financial intermediation
66	Insurance and pension funding
67	Activities related to financial intermediation
71	Renting of machinery and equipment
73	Research and development
741-743	Professional business services

ISIC Rev. 3	**Less-intensive ICT-using industries**
	Other Manufacturing
15-16	Food products, beverages and tobacco
17	Textiles
19	Leather, leather products and footwear
20	Wood and products of wood and cork
21	Pulp, paper and paper products
23	Coke, refined petroleum products and nuclear fuel
24	Chemicals and chemical products
25	Rubber and plastic products
26	Non-metallic mineral products
27	Basic metals
28	Fabricated metal products
34	Motor vehicles, trailers and semi-trailers

Appendix 3 (continued)

	Other Services
50	Repairs
55	Hotels and restaurants
60-63	Transport and storage
70	Real estate activities
745-749	Other business services (non-professional)
75	Public administration and defense; compulsory social security
80	Education
85	Health and social work
90-93	Other community, social and personal services
95	Private households with employed persons
99	Extra-territorial organisations and bodies
	Other Industries
01-05	Agriculture, hunting, forestry and fishing
10-14	Mining and quarrying
40-41	Electricity, gas and water supply
45	Construction

Source: van Ark et al. (2002)

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